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IMPORTERS AND MANUFACTURERS OF

PHILOSOPHICAL INSTRUMENTS,

CHEMICAL AND PHOTOGRAPHIC APPARATUS,

PURE CHEMICALS, &c., &c.



## CATALOGUE

OF

ELECTRICAL AND GALVANIC APPARATUS.



13 and 15, MOSLEY STREET,  
NEWCASTLE-ON-TYNE.

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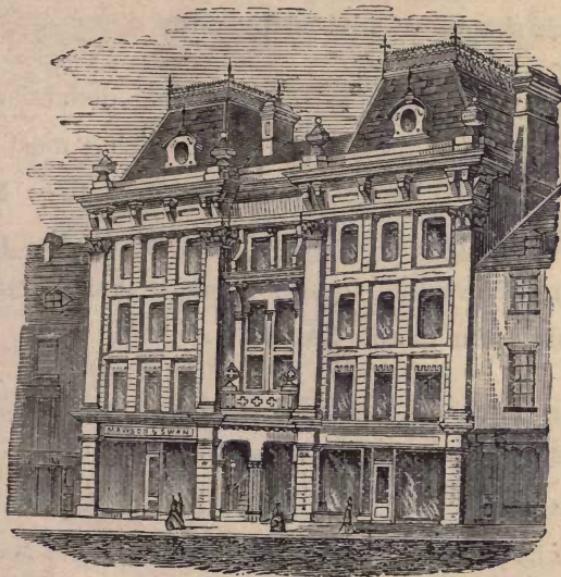
IMPORTERS AND MANUFACTURERS OF

*PHILOSOPHICAL INSTRUMENTS,  
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PURE CHEMICALS, &c., &c.*

## CATALOGUE

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ELECTRICAL AND GALVANIC APPARATUS.



13 and 15, MOSLEY STREET,  
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## TERMS, &c.

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## INDEX.

PAGE	PAGE		
Ampere's Stand . . . . .	34	Ebonite Discs . . . . .	14
Astatic Needles . . . . .	39	Ebonite, Rods of . . . . .	5
Aurora Borealis Apparatus . . . . .	12	Egg Stand . . . . .	13
Aurora Flask . . . . .	12	Electric Bells and Fittings . . . . .	42, 43
Batteries, various . . . . .	14, 15, 22, 23, 35	Electric Clocks . . . . .	31
Battery Cells . . . . .	19	Electric Light Apparatus . . . . .	26
Bells, Set of Chimes . . . . .	12	Electric Thermometers . . . . .	45
Bells, Electric . . . . .	42, 43	Electrolysis . . . . .	36
Bells, Telephone Call . . . . .	41	Electro-Magnet . . . . .	31
Bertch Machine . . . . .	8	Electrometers, or Electroscopes . . . . .	11, 12
Binding Screws . . . . .	20	Electro-Motive Models . . . . .	32, 34
Biot's Apparatus . . . . .	12	Electrophorus, Gutta-percha Base . . . . .	5
Brass Balls . . . . .	13	Electrophorus, Resin Plate . . . . .	5
Brass Chains . . . . .	13	Electrophorus, Volta's . . . . .	5
Brass Clamps . . . . .	13	Electro-Plating, Sundries for . . . . .	25
Brass Conductors . . . . .	13	Electrotype Apparatus . . . . .	25
Breguet's Telegraph . . . . .	38	Faraday's Butterfly Net . . . . .	12
Breguet and Crossley's Telegraph . . . . .	38	Faraday's Rotating Needle . . . . .	35
Bucket and Syphon . . . . .	13	Figure Plates . . . . .	13
Butterfly Net . . . . .	12	Fire Alarms . . . . .	45
Carbon Blocks . . . . .	20, 21	Floating Battery . . . . .	35
Carbon Blocks and Holders . . . . .	26	Frictional Electricity, Sets for . . . . .	9
Cat Skins . . . . .	5	Fulminating Pane . . . . .	13
Cement, Electrical . . . . .	13	Gaiffe's Batteries . . . . .	22
Coils, Medical . . . . .	22	Gaiffe's Electric Lamp . . . . .	26
Coils, Intensity . . . . .	24	Galvanometers . . . . .	32
Commutators . . . . .	21	Gas Lighters, Electric . . . . .	45
Compasses . . . . .	39	Geissler's Tubes . . . . .	24
Contact Breakers . . . . .	21	Glass Handles . . . . .	14
Cooke's Telephone Alarum . . . . .	41	Glass Rods . . . . .	5, 14
Copper Wire . . . . .	21	Gramme's Dynamo Machine . . . . .	26
Cylinders, Glass . . . . .	13	Grove's Batteries . . . . .	15
Cylinder Machines, various . . . . .	8	Gutta-percha Tissue . . . . .	21
Daniell's Batteries . . . . .	15, 16	Hand, Spiral . . . . .	13
Dipping Needles . . . . .	39	Head of Hair . . . . .	13
Dischargers . . . . .	11, 34	Hittor's Apparatus . . . . .	35
Door Triggers . . . . .	45	Holtz and Bertch Machine . . . . .	8

PAGE	PAGE		
Holtz Electrical Machine . . . . .	8	Resistance Coils . . . . .	35
Indicators . . . . .	46	Rheocord, Wheatstone's . . . . .	35
Insulators . . . . .	46	Rhumkorff Coils . . . . .	23
Intensity Coils . . . . .	24	Rods of Ebonite, &c. . . . .	5
Kinnersley's Thermometer . . . . .	13	Rubbers, Fur . . . . .	5
Leclanché Batteries . . . . .	16, 23	Sealing Wax, Rod of . . . . .	5
Leyden Jars, Batteries . . . . .	10	Siemen's Apparatus . . . . .	26
Leyden Jars, Conductors . . . . .	10	Skin, Cat . . . . .	5
Leyden Jars, Dischargers . . . . .	11	Smee's Batteries . . . . .	17
Leyden Jars, Insulators . . . . .	10	Solenoid . . . . .	35
Leyden Jars, various . . . . .	10	Stohrer's Battery . . . . .	23
Magnetism . . . . .	39	Sulphur, Rod of . . . . .	5
Magnetic Needles . . . . .	40	Switches . . . . .	21, 44
Magneto-Electric Exploder . . . . .	30	Tangent Galvanometer . . . . .	32
Magneto-Electric Machines . . . . .	24, 25, 29	Telegraphic Instruments . . . . .	38
Magnets, Electro- . . . . .	35	Telephones . . . . .	40, 41
Magnets, various . . . . .	39	Telephonic Experiments, Materials for . . . . .	41
Meidenger Batteries . . . . .	16	Thermo Piles . . . . .	19
Metallic Roller . . . . .	12	Thief Detectors . . . . .	45
Microphones . . . . .	41	Thunder House . . . . .	13
Oersted's Apparatus . . . . .	35	Tibbit's Batteries . . . . .	22
Orrery . . . . .	13	Tin Foil . . . . .	14
Phosphorus Cup . . . . .	13	Vacuum Tubes . . . . .	24
Pistol . . . . .	13	Vibrating Wire . . . . .	35
Pith Balls . . . . .	14	Voltaic Apparatus, Sets . . . . .	37
Pith Figures . . . . .	13	Voltaic Electricity . . . . .	34
Pith Ball Stands . . . . .	13	Voltameters . . . . .	36, 37
Plate Machines, Sets . . . . .	9	Whirl . . . . .	13
Plate Machines, various . . . . .	6, 7, 8	Wire Gauze Cylinder . . . . .	13
Plates for Machines . . . . .	14	Wires, various . . . . .	47
Platinized Silver . . . . .	21	Winter's Electrical Machine . . . . .	7
Platinum Foil or Sheet . . . . .	21	Wood Caps . . . . .	14
Plante's Secondary Battery . . . . .	18, 19	Yeates' Inductorium . . . . .	22
Press Buttons . . . . .	43	Zinc Cylinders . . . . .	21
Proof Plane . . . . .	12	Zinc Plates . . . . .	21
Pushes . . . . .	43, 44	Zinc Rods . . . . .	21

CATALOGUE OF  
*Electrical and Galvanic Apparatus.*

FRictional Electricity.

APPARATUS TO PRODUCE ELECTRICITY.

Rod of Sealing Wax, for the production of negative electricity, 1/6

Rod of Glass, smooth, from 1/-

Rod of Glass, roughened, from 1/6

Rod of Glass, half smooth, half roughened, 1/- and 2/6

Rod of Sulphur, 1/-

Rod of Ebonite, 1/-, 2/-, 3/6, and 4/6

Volta's Electrophorus, for obtaining the electric spark by induction, consisting of 12-in. ebonite plate with 8-in. brass plate and glass handle. Best finish, £1 1s.

Electrophorus, same construction, second quality, 13/6

Electrophorus, 12-in. resin plate, brass cover, glass handle, 10/-

Electrophorus, 12-in. gutta-percha base, and 10-in. disc of tin, with glass handle, 4/-

Cat Skins, 4/6 each.

Fur Rubbers, 1/-

## PLATE MACHINES.

Cheap form, French make, 10-in. plate, single conductor, on wood stand, 15/-

Ditto, 10½-in. plate, double conductors, with Leyden jar, 25/-

Ditto, 13-in. plate, ditto, better finished (Fig. 71), 50/-

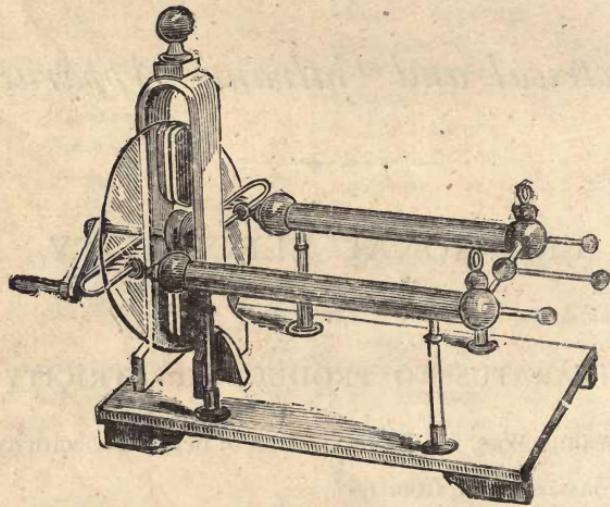


FIG. 71.

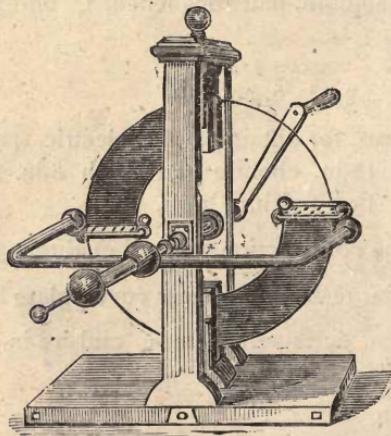


FIG. 72.

13 and 15, Mosley-street, Newcastle-on-Tyne.

Plate Machine, best make, with double rubbers and brass conductors, mounted on mahogany stands (Fig. 72)—

12 in. Plate...	...	...	£3 10 0
15-in. " "	...	...	5 0 0/-
18-in. " "	...	...	6 6 0

Similar construction, but not so well finished, 15-in. plate, 78/-

" " " 18-in. " 105/-

These can be supplied with discs of ebonite in place of glass, when desired, at a small advance in price.

Winter's Electrical Machine (Fig. 73), with condensing ring for increasing the length of the spark, 12-in. plate, £2 17s. 6d. ; 16-in. plate, £4 10s. ; 18-in. plate, £5 5s.

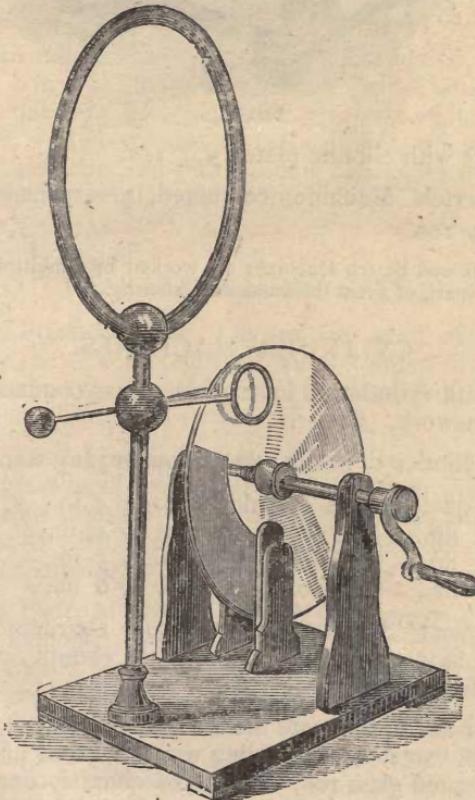


FIG. 73.

13 and 15, Mosley-street, Newcastle-on-Tyne.

Holtz Electrical Machine (Fig. 74), working by induction without rubbers, 16-in., 2 plates, £7 10s.; 4 plates, £10.

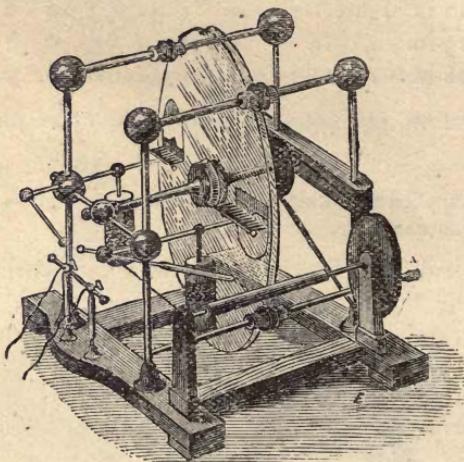


FIG. 74.

Bertch Machine with ebonite plate, £4 10s.

Holtz and Bertch Machine combined, a very handsome instrument, £5 10s.

Both the Holtz and Bertch Machines are worked by a multiplying wheel, and produce a spark of great thickness and intensity.

#### CYLINDER MACHINES.

Cheap form, with cylinder 10 in. by 6 in., brass conductor, and teak-wood framework, £1 1s.

Similar, with cylinder 11 in. by 7 in., on mahogany stand, £1 15s.

Machine, best quality, with cylinder 6 in. by 4 in., £1 5s.

Do. do. do. 7 in. by 4½ in., 1 10s.

Do. do. do. 8 in. by 5 in., 1 15s.

Do. do. do. 10 in. by 6 in., 3 3s.

*Improved Frictional Machine for Submarine Operations*: an exceedingly simple instrument, constructed of ebonite, and capable of firing 30 fuses at one time, £16.

A set of Apparatus to illustrate the *First Principles of Electricity*. It consists of two sticks of sealing wax, two rods of smooth glass, one roughened glass rod, one rod of ebonite, one rod of brass, a lath, flannel, and silk rubbers, box of amalgam, and an arrangement for suspending the rods. Packed in a box, 22/-

## EDUCATIONAL SETS OF APPARATUS, FOR STUDENTS, &c.

*These Sets are made up of First-class Instruments.*

Cheaper can be supplied, but are not here quoted.

### FRictional Electricity.

No. 1.—Electrical Machine with cylinder 6 in. long and 4 in. diam., mounted on mahogany stand, Leyden jar, brass discharger, glass tube, coloured glass hand spiral, brass chain and box of amalgam, in neat black box, £1 12s. 6d.

No. 2.—Same Apparatus as No. 1, but with larger machine and Leyden jar, and in addition six pith balls and pith ball stand, £2 5s.

No. 3.—Electrical Machine of superior construction, with cylinder 7 in. by 5 in., on mahogany frame, with brass conductors, 1 Leyden jar 7 in. by 4 in., 1 do.  $5\frac{1}{4}$  in. by  $2\frac{3}{4}$  in., brass jointed discharger, with glass handle, glass cylinder, coloured glass hand spiral, image plate and pith dancing figures, 12 pith balls, head of hair, electric whirl, brass chain, and box of amalgam, in neat black box, £3 3s.

### PLATE MACHINE SETS.

No. 1.—12-in. Plate Machine, Leyden jar, head of hair, whirl on mahogany stand, coloured hand spiral, jointed discharger, quadrant electrometer, brass chain, amalgam, &c., in neat black box, £4 17s. 6d.

No. 2.—12-in. Plate Machine, large Leyden jar, head of hair, whirl, coloured glass hand spiral, jointed discharger, quadrant electrometer, diamond coated jar, brass image plates and pith dancing figures, set of 3 bells, insulating stool, gunpowder vase, pith balls, brass chain, amalgam, &c., in black box, £6 15s.

No. 3.—15-in. Plate Machine, jointed dischargers, set of 3 bells, whirl on mahogany stand, head of hair, 2 large Leyden jars, diamond coated jar, coloured glass hand spiral, set of 5 spirals on mahogany stand, coloured tubes and revolving balls, brass image plate and pith figures, aurora or luminous flask, apparatus for showing the falling star, syringe for exhausting these vessels, insulating stool, gold leaf electrometer, thunder house, pith ball stand, brass chain, pith balls, amalgam, &c., in neat black box, complete, £13.

LEYDEN JARS,  $\frac{1}{2}$  pint, 2/-; 1 pint, 3/-; 2 pint, 5/-; 4 pint, 10/-

LEYDEN JAR BATTERIES, consisting of combinations of Leyden Jars, in tray, with connecting rods—

							L	s.	d
Set of four, about a pint each, French make, jars or bottles, with narrow mouth; the inside coating is gold leaf loosely put within	...	...	...	...	...	...	0	14	6
Set of four, pint size, in tray, English pattern (Fig. 75) ...	1	1	0						
Set of six, do. do. do. ...	1	10	0						
Set of four, quart do. do. do. ...	1	8	0						
Set of six, do. do. do. ...	1	18	0						
Set of six, 4 pint do. do. do. ...	3	6	0						

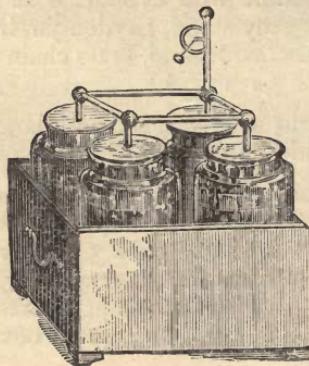


FIG. 75.

LEYDEN JAR, with movable Coatings to show that the charge is not in the coatings, 6/6. Do., do., superior form, 10/6

LEYDEN JAR, diamond spotted, pint size, 5/-; quart, 8/-

#### CONDUCTORS.

Conductors of 3 different forms—cylindrical, conical, and spherical, made of wood covered with tinfoil, and fitting on the stand,\* 6/-

Cylindrical Conductor, made of polished brass, with glass insulating support and iron foot, 14/6

Spherical Conductor, made of polished brass, 5-in. diameter, mounted on a glass insulating support, with foot, 16/-

#### INSULATORS.

\* Insulating Table Stand, with hollow glass support, 8 in. high, and capable of being raised to 13 in., 4/6

Insulating Table Stand, superior make, with loaded foot, 7/6

Insulator of Gutta Percha, 12 in. square,  $\frac{5}{8}$  thick, 5/-

Insulating Stools of Black Wood, on four solid glass legs, 5/6

Do. do. of polished mahogany, 7/6

Set of Glass Feet for Stools, 3/-

## DISCHARGERS.

Single Discharger, 3/-

Jointed Dischargers, 5/-

Do. do. with two handles, 8/6

Henley's Universal (Fig. 76), with table and press, 9/- and 18/-; with insulated handles, pair of carbon holders, and pair of forceps for holding fine wires, 25/-; larger size, 40/-

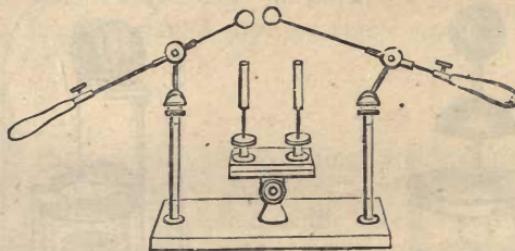


FIG. 76.

## ELECTROMETERS or ELECTROSCOPES.

Henley's Quadrant, a useful instrument, to measure the force of accumulated electricity in electrical jars and batteries, 3/6

The same, better finished, ivory arc, &amp;c., 7/6

Lane's Discharging Electrometer, 5/-; larger, 7/6

Bennett's Gold Leaf Electroscope, for showing minute quantities of electricity, 7/6 and 12/6

The same, large size, superior make, 21/-

Volta's Condensing Electroscope (Fig. 77), with 6-in. condenser and glass handle, 27/-; smaller size, 16/-



FIG. 77.

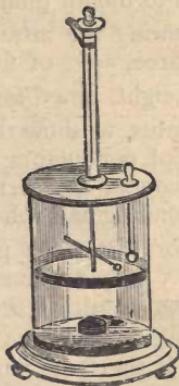


FIG. 78.

Coulomb's Torsion Electrometer (Fig. 78), for accurate measurement, £3 3s.

## ELECTROMETERS OR ELECTROSCOPES—continued.

Peltier's (Fig. 79), for measuring the tension of electricity by the deflection of a needle, £3 10s.

Harris' Balance Beam, for estimating in grain weights the attractive power between two oppositely electrified surfaces, £4 4s.



FIG. 79.

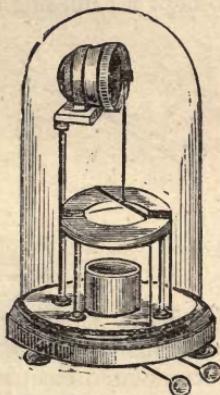


FIG. 80.

Cuthbertson's Compound Discharging Electrometer, 35/-  
Thomson's Electrometer (Fig. 80), £6 6s.

## EXPERIMENTAL APPARATUS.

Aurora Flask, 4/6

Aurora Borealis Apparatus, consisting of an egg-shaped globe, adapted to fit on to the air pump, with brass foot, 25/- and £2.

Bells, for showing the attractive and repulsive power of electricity, set of three, 5/6; of five on stand, 14/-

Bells, set of eight, tuned for Electrical Chimes, 27/-

Biot's Apparatus, to show that Electricity is distributed only on the surface of conductors and not on the interior, consisting of a hollow copper sphere mounted on an insulating stand, and two corresponding half spheres, with handles, £1 15s.

Apparatus for the same purpose, consisting of a hollow copper sphere, 5 inches diameter, with an aperture at top, the whole on insulating stand, 16/6

Metallic Roller, with glass handle, and roll of tin foil, on insulating stand, for the same purpose as the two preceding, 25/-

Proof Plane, or Electrical Carrier, for use with the above apparatus, 1/-

Faraday's Butterfly Net, with glass handle, 1/6

Do. do. on insulating stand, 3/6

Wire Gauze Cylinder, on insulated stand, with Ball, 8/6  
 Bucket and Syphon, from which before being electrified the water drops slowly, but when electrified runs freely, 2/9  
 Egg Stand, for showing the passage of the electric spark through a column of eggs, 5/-  
 Figure Plates, for pith figures, 5/- and 7/6  
 Pith Figures, various kinds, from 9d. each.  
 Fulminating Pane, a simple form of condenser, for giving strong shocks, 6/6  
 Hand Spiral, 3/- and 3/6  
 Head of Hair, 3/6  
 Kinnersley's Thermometer, for showing atmospheric disturbance caused by the passage of the electric spark, 12/6  
 Orrery, to illustrate the revolution of the moon round the earth, and of the earth and moon round the sun, 4/-  
 Phosphorus or Spirit Cup, 5/6 and 7/-  
 Pith Ball Stand, 2/-, 3/-, and 4/-  
 Pistol, for the explosion of mixed gases by the electric spark, 4/-  
 Thunder House, to show the effect of the electric discharge, 6/-  
 Whirl, 2/-; Ditto, with revolving spiral, on stand, 11/6  
 Words "Fire" or "Light," also various other devices on glass, in mahogany frames, 4/6 and 6/6

---

## MATERIALS FOR THE CONSTRUCTION OF ELECTRICAL MACHINES, &c.

### Brass Balls—

Inch	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	diam.
Price	2d.	3d.	4d.	5d.	6d.	8d.	10d.	1/3	2/-	each.

Brass Clamps for fixing apparatus to tables, &c., 3/6 each.

Brass Conductors...	5	6	7	8	10	inch.
Price	3/-	3/6	4/-	5/6	9/-	each.

Brass Chain, per yard, 6d.

Cement, Electrical, for cementing caps, &c., to glass rod, in tins, 1/- and 2/6 each.

### Cylinders, Glass—

Approximate measures.	$6 \times 3\frac{1}{2}$	$6\frac{1}{2} \times 4$	$7 \times 5$	$8 \times 5\frac{1}{2}$	$10 \times 6$	$11 \times 7$	inches.
Price	1/6	2/6	3/-	3/6	4/6	6/-	each.

Plates for Machines, of patent plate, hole drilled through centre and edges polished. If over  $\frac{1}{4}$ -inch thick and with square holes, an extra price will be charged.

Inches	9	12	15	18	24	diam.
Price	6/6	9/-	14/-	20/-	33/-	each.

Ebonite Discs for Electrical Machines—

$\frac{1}{8}$ -inch thick	12	15	18	inch diam.
Price	6/9	9/3	12/9	each.

$\frac{1}{4}$ -inch thick	21	24	30	36	inch diam.
Price	28/9	35/-	50/-	70/-	each.

Ebonite Discs for Electrophorous Plates—

$\frac{1}{4}$ -inch thick	12	15	18	21	24	30	36	in. diam.
Price	9/6	13/9	19/-	26/6	31/6	49/-	65/-	each.

Glass Rod, for the insulating supports,  $1/4$  per lb.

Glass Handles, for dischargers, each 1/- and 1/6

Pith Balls, per doz., 9d.

“ large size, coloured, per doz., 2/-

Tin Foil, per lb., 2/6 and 3/6

Wood Caps, pair and handle for cylinder machines, 2/6

## GALVANIC APPARATUS.

### BATTERIES.

*Bichromate Batteries.*—Small size, in glass jar, 2/6 and 3/6

Bottle Form: single element signifies two carbon and one movable zinc plate; double element signifies three carbon and two movable zinc plates.

Capacity	-	4	$\frac{1}{2}$	1	2	3	4	8	pints.
Price, single	{	4/9	7/-	9/-	12/6	14/-	16/-	30/-	each.
element									

Double - - - - - - - - 20/- 23/- 38/- ,

Very useful Form, consisting of a number of elements, each element composed of one carbon and one zinc plate, each  $2\frac{3}{4}$  in. by 1 in., fitted on to a wood bar, so that they may be readily removed from the exciting liquid which is contained in glass cells, the whole mounted in a simple wood frame.

Number	2	4	6	8	elements.
	5/6	9/-	12/6	15/-	

The same with windlass arrangement to withdraw the plates, eight elements, 18/6



FIG. 87.

13 and 15, Mosley-street, Newcastle-on-Tyne.

*Bunsen's Batteries.*—These consist of an outer cell of glass or earthenware, with a cylinder or curved plate of zinc, within which is a porous jar and block or plate of carbon. The exciting fluids are diluted sulphuric acid in the outer, and strong nitric acid in the inner jar. Complete with clamps, &c., best make. (Fig. 88.)

Size of Carbon	$2\frac{3}{8} \times \frac{7}{16} \times \frac{7}{16}$	$3\frac{1}{4} \times 1 \times 1$	$4\frac{1}{4} \times 1\frac{5}{16} \times 1\frac{5}{16}$	$4\frac{3}{4} \times 1\frac{5}{8} \times \frac{3}{4}$	$6\frac{3}{8} \times 1\frac{3}{4} \times \frac{3}{4}$ in.
Price each element	2/6	3/-	4/-	5/-	6/6

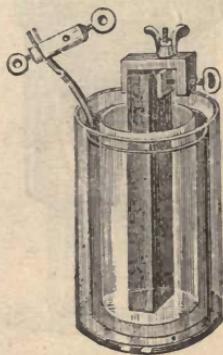


FIG. 88.



FIG. 89.



FIG. 90.

With flat outer cell, bent zinc plate (Fig. 89), 5/- each.

Cheaper form, round earthen or glass jar, zinc cylinder, without clamp, but with copper strap soldered upon. (Fig. 90.)

Height in inches	3	4	5 $\frac{1}{2}$	6 $\frac{1}{2}$	7	8	8 $\frac{1}{2}$	10	12
Price each	-	- 2/-	3/-	4/6	5/-	6/6	8/-	10/-	12/- 18/6

Ten Cell Bunsen Battery in Tray, £2 15s.

Arrangements smaller or larger to order.

*Grove's Batteries.*—These consist of a square glass or earthen outer cell with a bent zinc plate, a flat porous cell with a sheet of platinum within; it thus resembles the Bunsen form, platinum being substituted for the carbon; the exciting fluids are the same as for Bunsen's.—Price 9/- per cell, pint size. In trays of four, 38/-; in trays of ten, 84/-; superior finish, 105/-

*Daniell's Batteries.*—Outer cell copper, porous jar with zinc rod, exciting fluids, solution of copper sulphate in the copper cell, diluted sulphuric acid in the porous cell. Pint size, 4/6; quart size, 6/6

*Daniell's Batteries.*—Of Glass (Fig. 92), with balloon holding reserve of copper solution, 5/-

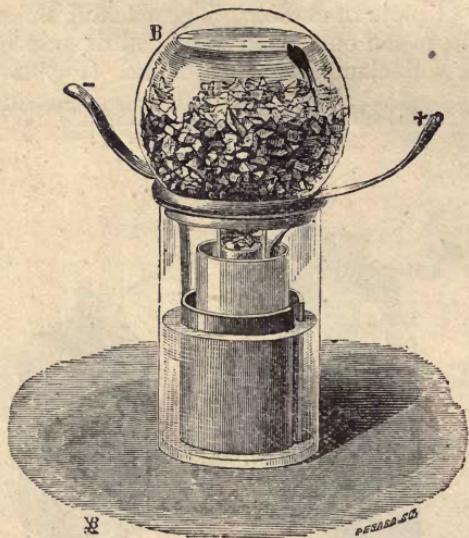


FIG. 92.

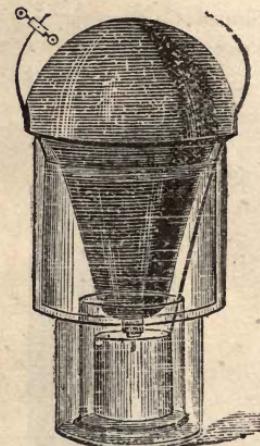


FIG. 93.

*Meidenger Battery* (Fig. 93).—This element is much used on the continent for electric bell and similar purposes; it is excited with solution of sulphate of magnesia in outer, and sulphate of copper in inner cell, and will keep in action for a long time if left undisturbed.

Height without Balloon	- -	6	7	9	in.
Price	- - - - -	4/6	5/6	7/-	each.

*Leclanché Batteries.*—The most useful form for Electric Bells and other purposes where constancy is required, and is now also much in request for medical use. The outer cell usually of glass, with a zinc rod; porous cell sealed, containing a plate of carbon, with a mixture of broken carbon and peroxide of manganese; the exciting fluid is a solution of sal-ammoniac.

	Nos. 1	2	3
Cells complete	6/6	4/6	3/6

Parts supplied separately, thus—

Charged Porous Jars	- - -	3/6	2/10	2/3
Glass Jars	- - -	2/2	1/3	1/10
Zinc Rods	- - -	7/6	7/5	7/4
Sal-ammoniac	- - -	7/4	7/3	7/3

The Silvertown Firing Cell, a powerful form of the Leclanché Battery, in ebonite case, 15/-

The Naval Firing Cell, for firing Torpedoes, &c., £18 10s.

Further particulars on application.

*Smees Batteries.*—Two zinc plates, with one of platinised silver between, the exciting liquid diluted sulphuric acid, 1 to 7.

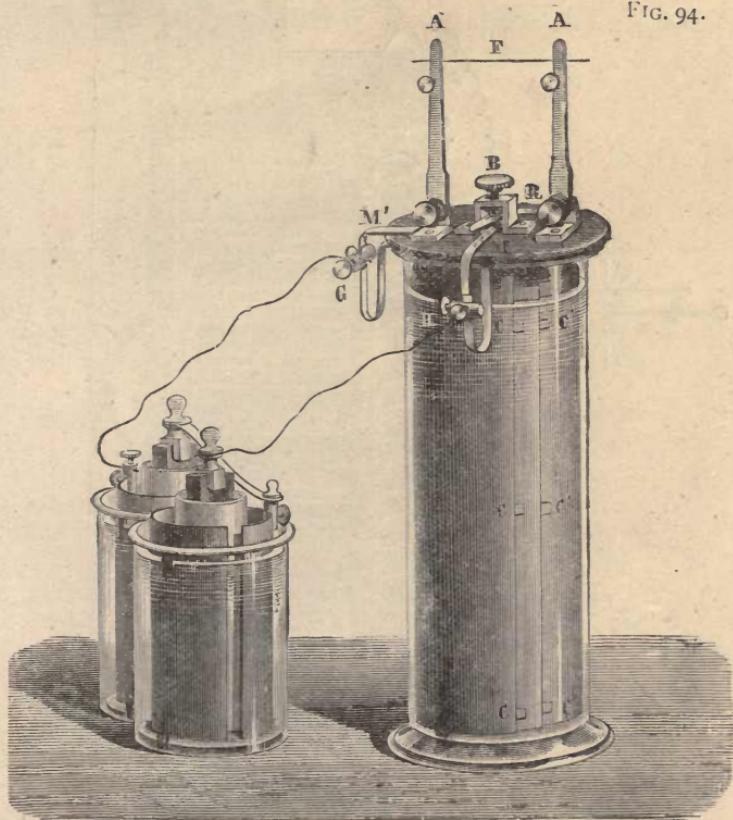
To keep these batteries in good order the zinc plates should be amalgamated frequently.

Very best finish (Fig. 94), 6/-, 12/-, 17/6, and 24/- each.

Ordinary form, square earthenware cell, half-pints, 4/-; pints, 5/6; quarts, 8/-. Set of six, pint size, in tray, 35/-.



FIG. 94.



A. JAHANDIER.

C. LAPLANTÉ.

FIG. 95.

13 and 15, Mosley-street, Newcastle-on-Tyne.

*Planté's Secondary Battery.*—With this battery, charged by two of Bunsen's elements or a Gramme machine of medium size, all the experiments in diamagnetism and the electric light can be produced for which large batteries are usually employed. The battery will require recharging after some minutes, but will remain in action long enough to allow of all these experiments being observed.

*Planté's Secondary Cell*, surface of lead about 125 square inches, 15/-

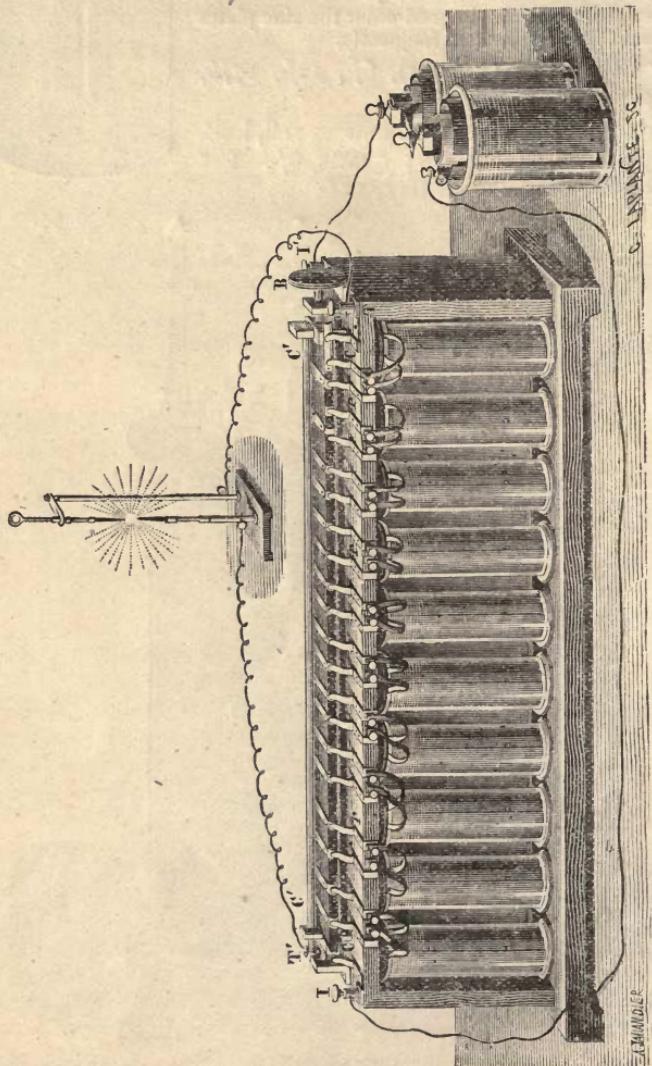


FIG. 96.

13 and 15, Mosley-street, Newcastle-on-Tyne.

*Planté's Secondary Cell*, large size, surface of lead about 620 square inches (See Fig. 95, page 17), £1 8s.

*Planté's Secondary Cell* of 20 small sized cells, with Commutator to join them all in tension or quantity (Fig. 96), £12 10s.

**THERMO PILES FOR GENERATING ELECTRICITY BY HEAT.**—Thermo Piles of 24 pairs of bismuth and antimony, in brass frame, and mounted on brass rising stand, £1 5s.

Ditto 28 pairs, with silvered cone, £1 12s.

Ditto 80 pairs, provided with silvered cone at each end, leather caps, and mounted on brass stand with universal movement, £4 12s.

Thermo-electric pair of bismuth and antimony, V shaped, with wires for connecting it with a galvanometer, 7/6

Clamond's Thermo-electric Pile supplied to order.

## SUNDRIES FOR THE CONSTRUCTION OF BATTERIES, &c.

**BATTERY CELLS, OUTER.**—Round earthenware for Bunsen's—

4 x 3 8d., 6 x 4 1/-, 8 x 6 1/4 each.

Round Glass—Inches	4	5	6	8	high.
	6d.	8d.	1/-	2/-	each.

Battery Cells, flat earthenware, for Grove's or Smee's—

4 $\frac{1}{4}$ x 3 x 1 $\frac{1}{2}$	5 $\frac{1}{8}$ x 3 $\frac{5}{8}$ x 1 $\frac{1}{2}$	5 $\frac{7}{8}$ x 4 $\frac{1}{8}$ x 1 $\frac{3}{4}$	
1/-	1/3	1/6	each.

Battery Cells of various other materials, ebonite, gutta-percha, &c., and in sizes too numerous to detail. Any kind not in stock procured to order.

Battery Cells, round porous—

Length in inches	3	4	5	6	7	8	9	10	11	12
Diameter - - -	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	2	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$
Price - - -	3d.	3d.	3d.	4d.	5d.	6d.	7d.	9d.	1 $\frac{1}{2}$	1 $\frac{1}{4}$ each

Battery Cells, flat porous—

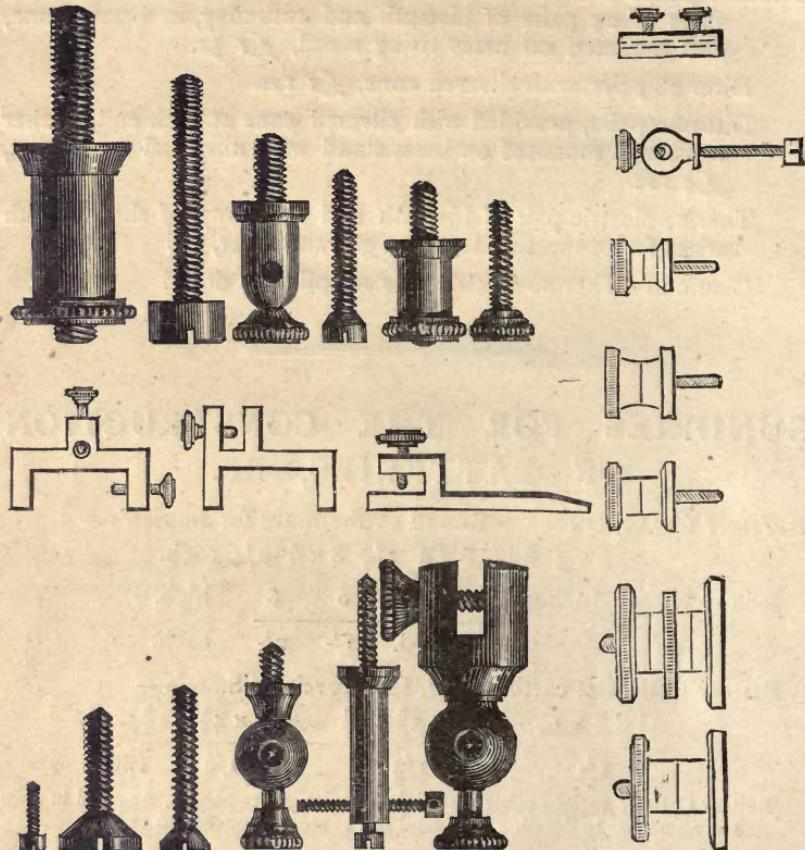
Inches	4 $\frac{1}{2}$ x 2 $\frac{1}{2}$ x $\frac{1}{2}$	5 x 3 $\frac{1}{2}$ x $\frac{1}{2}$	6 x 4 x 1	7 x 4 $\frac{1}{2}$ x $\frac{1}{2}$
Price	5d.	6d.	1/3	1/3 each.

## BINDING SCREWS.

Brass Pillars, to screw into wood, 4d., 5d., and 6d. each ;  
3/6, 4/6, and 5/6 per dozen.

Brass Pillars, with loose steel screw to come through wood into  
the brass pillar, French pattern, same prices.

Brass Clamps for Zincks, 6d. each ; 5/6 per dozen.



Brass Clamps for Carbon, 6d., 8d., and 10d. each ; 5/6, 7/6, and  
9/6 per dozen.

Clamps with two screws to join wires, 6d. each ; 5/6 per doz.  
For large wires or cable, 1/6 each.

Clamps for various other purposes.

Any of these Clamps and Screws can be had nickel plated at small extra cost.

## CARBON BLOCKS—

Price	$6 \times 1\frac{1}{2} \times 1$	$7 \times 1 \times 1$	$8 \times 1\frac{1}{4} \times 1\frac{1}{4}$	$9 \times 1\frac{1}{2} \times 1\frac{1}{2}$	inches.
	8d.	1/-	1/6	2/-	each.

13 and 15, Mosley-street, Newcastle-on-Tyne.

Carbon Plates,  $4 \times 2$   $6 \times 3$   $8 \times 4$   
 Price 6d. 1/- 1/9 each.

Copper Wire, per lb., No. 16, 2/6; No. 24, 3/4

Copper Wire, covered with cotton, conductivity of copper guaranteed 90 per cent and upwards.

Nos.	14	16	18	20	24	28	32	36
Feet to lb.	48	70	128	220	420	960	1,300	3,810
	2/9	2/9	2/9	3/-	4/-	5/6	8/6	10/-

Copper Wire, covered with silk, the silk specially prepared for insulation.

Nos.	16	24	28	32	36	40	42
	6/6	8/6	10/6	13/6	18/-	28/-	36/-

These covered wires, though not the cheapest, are the best procurable. In smaller quantities than 1 lb. a slight advance in price is made.

Copper Wire, covered with India rubber and gutta-percha, see Electric Bells.

Copper Strand, covered with cotton, plaited, very flexible; useful for battery handles and a variety of connections, 6d. per yard; double strand, 10d. per yard.

Commutators, or Switches, for turning off or diverting the current, one way 3/-, two way 3/6, three way 4/-; for affixing to coil, 6/- and 8/6; on separate stand, best quality, 10/6

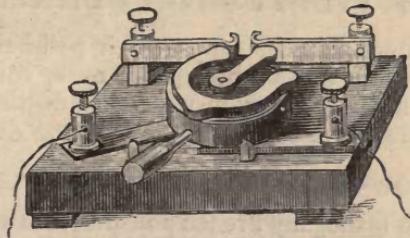


FIG. 92A.

Contact Breakers, 3/6, 4/6, 5/-, 6/6 each. Bertin's (Fig. 92A), 35/-

Gutta-Percha Tissue, 2/- per yard, about 24 inches wide.

Platinum, Foil or Sheet, 5/- dram; price varies.

Platinised Silver, for Smee's battery, 12/- oz.

Zinc Cylinders, for Bunsen's—

Height in inches	$3\frac{3}{4}$	6	7	8
	1/-	2/-	2/3	2/6

Zinc Plates, bent for Grove's or Bunsen's, 1/6 and 2/- each.

Zinc Plates for Smee's, per pair, 1/- and 1/6

Zinc Rods for Daniell's, 4½-in. 6d., 6-in. 9d., and 9-in. 1/-

„ „ star shaped, 1/3 each.

## COILS AND BATTERIES FOR MEDICAL USE.

### FOR INTERMITTENT CURRENT.

Coil, small Medical, on stand, 14/-

Do. do. more powerful, 18/6

Very compact, for Pocket, in handsome mahogany box, handles within, with regulator, requires a separate battery, 20/-

Fitted in mahogany boxes, with Smee's Battery—No. 1, 18/-; No. 2, 30/-; No. 3, 50/-

Gaiffe's Chloride of Silver Battery, for travelling (outside size  $6\frac{3}{4} \times 3\frac{1}{2} \times 1\frac{1}{2}$  inches), £2 2s.

Yeates' Inductorium, £3 3s. and £5 5s.

## DR. TIBBITS' BATTERIES.

Induction Instrument, in mahogany French polished case, with lock and key, brass handle, hooks and eyes, coil, break circuit, graduator, till for sponges, insulated conducting wires, pair of disc rheophores, wire brush, steel lever, &c., £6 6s.

### VOLTAIC OR CONSTANT CURRENT INSTRUMENTS.

15 Cell	Battery	in mahogany French polished case with brass handle, lock and key, hooks and eyes, till for sponges, graduating dial, pair of cylindrical rheophores, insulated conducting wires, sponges, &c.	-	-	-	-	-	£5 5 0
20 Cell	do.	do.	do.	-	-	-	6 6 0	
30 Cell	do.	do.	do.	-	-	-	8 8 0	
40 Cell	do.	do.	do.	-	-	-	10 10 0	
50 Cell	do.	do.	do.	-	-	-	12 12 0	

And an addition of £2 2s. for each 10 Cells to the large Hospital Battery of 100 Cells, price - - - 23 2 0

All Batteries of more than 30 Cells are furnished with an Interrupter and a Commutator of the Poles, but these fittings are only affixed to the smaller Batteries when specially ordered, and at an additional charge of £1 1s.

13 and 15, Mosley-street, Newcastle-on-Tyne.

## COMBINED INSTRUMENTS.

*Combining in one instrument both Voltaic and Induction Batteries.*

Combined Battery, consisting of 30 Voltaic Cells and an Induction Instrument, in mahogany French polished case, with brass handle, lock and key, hooks and eyes, graduating dial, battery break, commutator of the poles, till for sponges, insulated conducting wires, a pair of cylindrical rheophores, pair of disc rheophores, wire brush, sponges, &c. £14 14 0

Do. do. 40 Cells and Induction Instrument 16 16 0

Do. do. 50 do. do. do. 18 18 0

A variety of other Patterns, and every improved form, added to stock as introduced.

## FOR CONTINUOUS CURRENT.

The Leclanché Medical Battery is strongly recommended as the most constant form at present made; it requires also no attention, is always ready for use, and emits no unpleasant odour, and will, if fairly treated, continue in action for two years or more without any attention, when it can be recharged at a small cost.

## PRICE—

Simple Batteries—20 cells, £4 10s.; 30 cells, £6; 40 cells, £7.

With Current Breaker—20 cells, £5 10s.; 30 cells, £7 10s.

With Current Breaker, Commutator, and Pole Reverser—40 cells,

£11; 50 cells, £12 10s.; 60 cells, £14 10s.

All the Batteries are fitted in Polished Teak or Mahogany Boxes.

RHUMKORFF'S INTENSITY COILS, for working vacuum tubes and other experimental purposes; well-made instruments.

Length of spark	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	2 inches.
Price	- - -	13/6	22/6	45/-	63/-	84/-	£7 £8/10/-

Larger sizes we quote for specially.

## VACUUM TUBES.

	£ s. d.	£ s. d.
Set of 4 different Tubes, in cardboard box .. .. ..	0 6 0	Flower with 4 petals—
Set of 6 do., 2 varieties .. .. ..	0 10 0	11/-, 16/- and 1 4 0
Do. 6 do., larger .. .. ..	0 18 6	Flower with 2 petals—
Do. 5 do., double envelope .. .. ..	0 18 6	11/-, 16/- and 1 4 0
Do. 5 do., larger .. .. ..	1 2 0	Coquille Dentelée—
Gassiot's Cascade—		10/-, 15/- and 1 8 0
7/6, 11/-, 16/- and 1 4 0		Tête de Diable .. 10/6 and 0 14 0
Flat Spiral in Globe, with or without liquid—		Do. Chinaman .. 0 14 0
8/-, 9/-, 13/-, 20/- and 1 4 0		Holtz Tube, to show the direction of currents .. 20/- and 2 0 0
Marguerite Spiral—		De la Rive's Apparatus, to show the rotation of currents .. .. .. 24/- and 1 16 0
8/-, 9/-, 13/-, 20/- and 1 4 0		Spectrum Analysis Tubes, Hydrogen, Oxygen, Nitrogen, Iodine, Cyanogen, Ammonium, Carbonic Acid, and Protoxide of Nitrogen
Conic Spiral .. 10/-, 16/- and 1 4 0		each 0 6 0
Ganot's Tube—		The above in box complete 2 0 0
10/-, 15/-, 20/- and 1 4 0		Luminous Diadem—
Tube with 2 Concentric Globes, with different gases 8/- and 0 16 0		20/-, 40/- and 3 10 0
U Tube, with or without liquid .. 9/-, 11/-, 15/- and 1 4 0		Do. Aquarium, 20/- and 1 10 0
Bent Tube, with 6 fluorescent liquids .. .. .. .. 2 0 0		Do. Miner's Lamp .. 0 14 0
Do. do. do. .. 1 10 0		Medical Tube to illuminate the Throat .. .. .. 0 16 0
Egg-shaped Tube, with cross—		Luminous Inscription on black board, each letter according to size, 2/-, 4/- and 0 8 0
8/-, 16/- and 1 4 0		
Long Tube, with uranium bulbs .. 10/-, 14/-, 20/- and 1 4 0		
Spiral Tube, 8/6, 16/-, 24/- and 1 10 0		

## MAGNETO-ELECTRIC MACHINES.

In these instruments the electricity is produced by the rotation of a coil of insulated wires in front of or between the poles of a permanent magnet, therefore no Battery is required; the strength of the current is adjusted by the position of the armature or keep.

Magneto-Electric Machine, in mahogany case, and drawer containing set of directions, £2 5s.

Magneto-Electric Machine, on marble slab, 27/-

Do. do. first-class make, with handles, complete, 24/-, 28/6, and 35/- This is the kind in very general use.

Magneto-Electric Machine, very portable, in mahogany case,  $5 \times 3 \times 2\frac{3}{4}$  inches (can be recommended), 25/-

Magneto-Electric Machine, with two magnets and multiplying gear, in polished walnut wood case (a very powerful instrument), capable of heating platinum wire to redness, decomposing water, and for blasting purposes, &c., 63/-

Gaiffe's Magneto-Electric Machine, giving a current in one direction (a beautiful instrument), 63/-

## ELECTRO-METALLURGY.

### ELECTROTYPE APPARATUS.

Single Cell, one-quart size, complete, 4/-

Do. very superior construction, for small work, 5/6

Quart size, in deal box, with moulds, plumbago and bronzing powders, brushes, and three bottles of chemicals, 15/6

Stoneware Troughs, for depositing,  $8 \times 8 \times 3$  inches, with brass bars and screws, 7/6

Do. do. do.  $12 \times 8 \times 3$  inches, 9/-

Larger size Trough,  $12 \times 8 \times 8$ , complete, with one-quart Daniell's Battery, 21/-

Apparatus for Electro-Plating and Gilding, complete, with four Smee's Batteries in tray, depositing trough circular, 10 inches deep, 8 inches wide, 35/-

### Books on Electro-Plating.

Gore's Metallurgy, 6/-; post free 6/4

Electro-Deposition, 1/6; post free 1/8

### SUNDRIES FOR ELECTRO-PLATING.

	s. d.		s. d.
Gold Solution .. .. per pint	6 0	Boxwood Sawdust .. per lb.	
Silver do. .. .. .. "	3 0	Borax .. .. .. ..	2 0
Nickel do. .. .. .. "	1 6	Plumbago .. .. .. ..	2 6
Copper do. .. .. .. "	1 0	Brushes for ditto ..	6d. and 1 0
Powdered Pumice Stone, per lb.	0 8	Silver Solder .. ..	per oz. 6 c
Burnishers, Steel .. .. each	1 4	Soft do. .. .. ..	per lb. 1 6
Do. Agate .. .. .. "	5 0	Rotten Stone .. .. .. ..	0 8
Scratch Brushes .. .. .. "	1 0	Caustic Soda .. .. .. ..	1 0
Chamois Leather .. .. .. "	0 9	Medallions .. .. .. ..	per doz. 3 0

## ELECTRIC-LIGHT APPARATUS.

## SIEMEN'S ELECTRIC-LIGHT APPARATUS.

(A) Patent Dynamo Apparatus, giving the light of about 2,000 standard candles at about 850 revolutions per minute of the induction cylinder, and an absorption of about  $2\frac{1}{2}$  HP.; dimensions 23 in.  $\times$  22 in.  $\times$  10 in.; weight 298 lbs. Price £65.

(B) Patent Dynamo Apparatus, giving the light of 4,000 to 6,000 standard candles at about 650 revolutions per minute of the induction cylinder, and an absorption of about  $3\frac{1}{2}$  HP.; dimensions 29.5 in.  $\times$  27.6 in.  $\times$  10.6 in.; weight 419 lbs. Price £100.

SIEMEN'S PATENT SELF-REGULATING ELECTRIC LAMP (small size), without reflector, for use with Machine A. Price £14.

Do., large size, for use with Machine B. Price £30.

These prices are in London, exclusive of packing, and for cash on delivery.

GRAMME DYNAMO MACHINES, FOR CONTINUOUS AND INTERMITTENT CURRENTS.—These are of French manufacture, and are coming into use in France for the lighting of factories and large areas. Prices on application. (See Illustration of Continuous Current Machine attached.)

When any of our clients contemplate the introduction of the Electric-light, we shall be very happy to assist and advise them; our experience in this direction enables us to do so very thoroughly. Improvements and alterations are constantly being made, so that the particulars above are applicable only to the time of publishing this list.

ELECTRIC LAMP, Duboscq's (clockwork arrangement), £10.

ELECTRIC LAMP, Serrin's, with automatic regulator (See Illustration attached). This is a very convenient Lamp. £18.

Hinged Reflector to use with this Lamp, £3.

Special form, opal globe for diffusing the light.

Holder to attach to Lamp.

GAIFFE'S ELECTRIC LAMP (See Illustration attached), £10.

Cheaper Forms of Electric Lamps (Fig. 104), 42/-, 50/-, and 60/- All the various modifications as introduced.

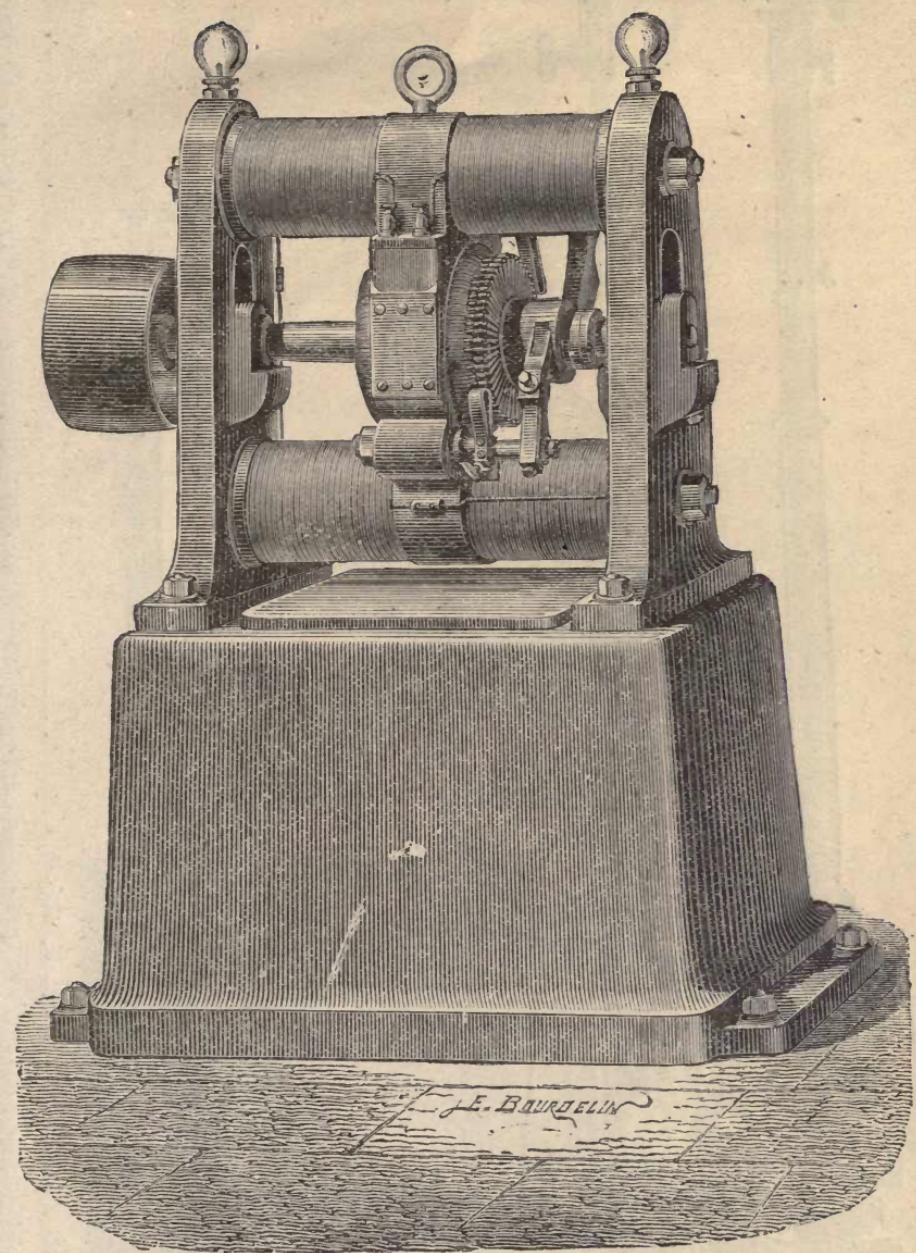
CARBON HOLDERS, per pair, 2/6.

Do. 10/6.

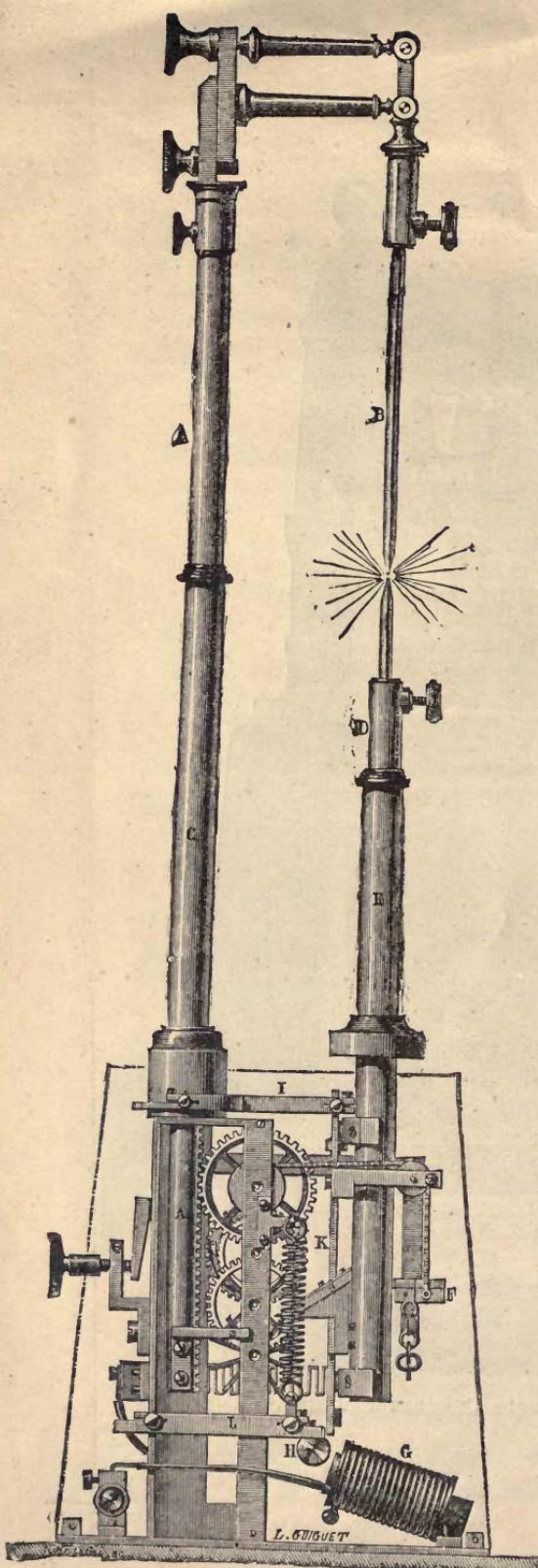
ROUND MOULDED CARBON PENCILS, compressed—

	Diameter.	Per ft.		Diameter.	Per ft.
	s. d.	s. d.		s. d.	s. d.
No. 1 .....	.039 in. ....	0 8	No. 10 .....	.390 in. ....	1 0
,, 2 .....	.078 " ....	0 8	,, 11 .....	.429 "	1 4
,, 3 .....	.117 " ....	0 8	,, 12 .....	.468 "	1 4
,, 4 .....	.156 " ....	0 8	,, 13 .....	.507 "	1 4
,, 5 .....	.195 " ....	0 8	,, 14 .....	.546 "	2 0
,, 6 .....	.234 " ....	0 8	,, 15 .....	.585 "	2 0
,, 7 .....	.273 " ....	0 8	,, 16 .....	.624 "	2 0
,, 8 .....	.312 " ....	1 0	,, 17 .....	.702 "	2 6
,, 9 .....	.351 " ....	1 0	,, 18 .....	.780 "	2 6

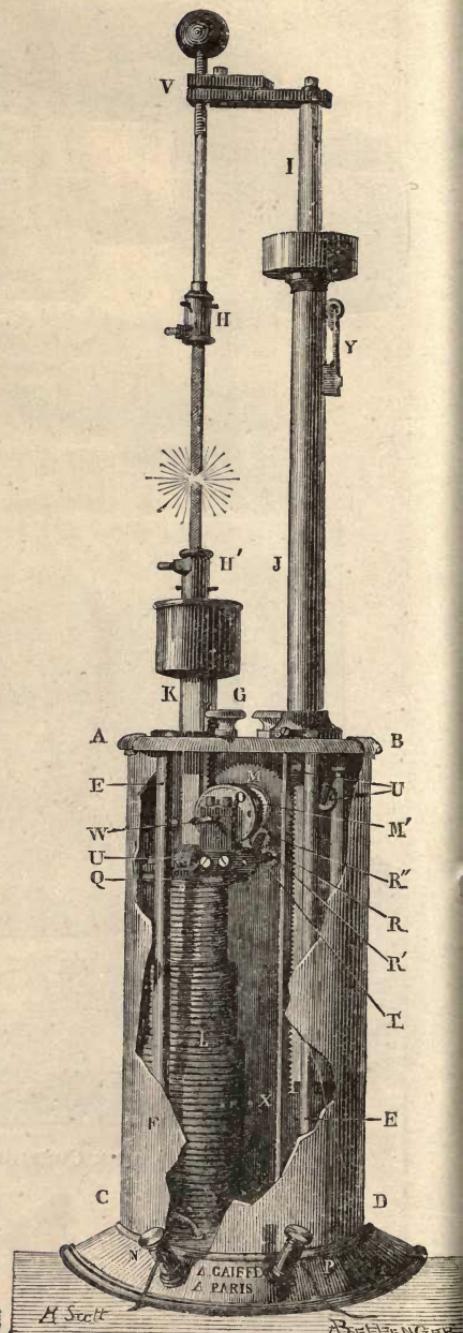
Carbons for Serrin's and Siemen's Lamps, 1/- to 1/4 per foot.



THE GRAMME CONTINUOUS CURRENT MACHINE.



SERRIN'S ELECTRIC LAMP.



GAIFFE'S ELECTRIC LAMP.

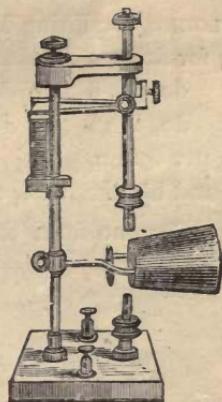


FIG. 104.

MAGNETO-ELECTRIC MACHINE (Fig. 106), with Jamin's Magnets, for demonstration for laboratories and science classes, to work by hand. Equal to 5 or 6 ordinary Bunsen's Cells. £35 and £40. This Machine will serve also for Telegraphy and Electro-Metallurgy. For these different purposes it is supplied with bobbins, wound with wires of different sizes—fine for tension, thick for quantity.

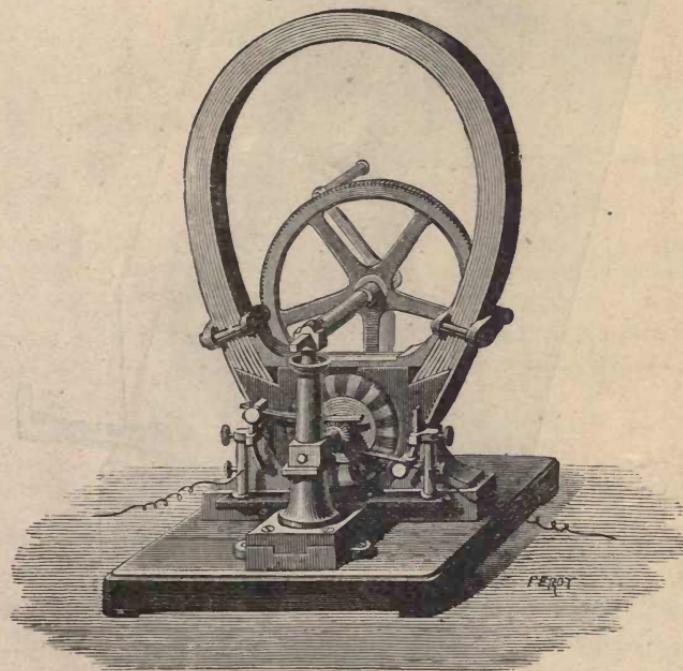


FIG. 106.

13 and 15, Mosley-street, Newcastle-on-Tyne.

MAGNETO-ELECTRIC EXPLODER, for Firing Mines (Fig. 107)—

Breguet's Exploders, for firing 2 Abel's Fuses, £6.

Do. do. 8 do. £10.

Do. do. 12 do. £15.

Fuses, experimental, per dozen, 3/-

Do. for dynamite and blasting, &c., each, 6d., 1/-, and 1/6.

Cable for conducting the Current from the various Machines required, price according to size.

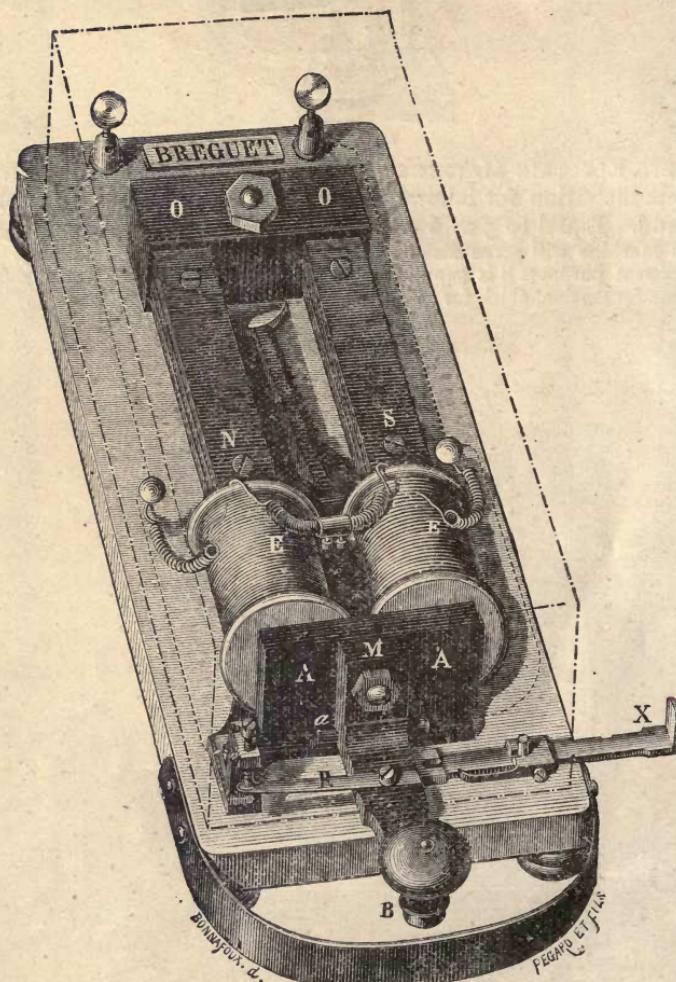
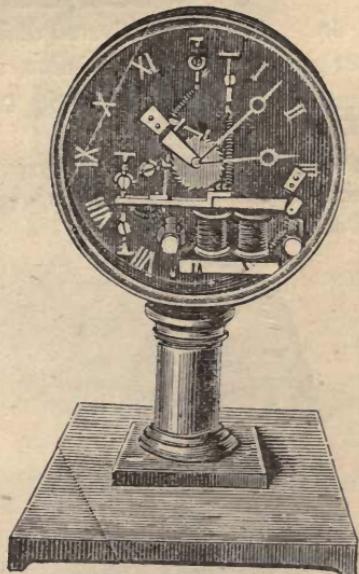


FIG. 107.

13 and 15, Mosley-street, Newcastle-on-Tyne.

## ELECTRIC CLOCKS.



Electric Clock, as illustration above, to be worked from a Normal Clock, with glass face for the lecture table, £3 3s.

Various other patterns for house use, public institutions, factories, &c., procured to order. We undertake also the fitting up and supply of the Regulator Clock, and shall be glad to furnish any information upon application.

Clocks, Tell-tale, or Watchmen's Recorder, constructed to show on a sheet of paper the time and number of the watchman's visits to the various stations he has charge of.

Clock and Instrument for six stations - £24.

Each extra station, £3.

## ELECTRO-MAGNETISM.

Electro-Magnet, with Armature, length of arms, 3 in. 2/6, 4 in. 4/-, 5 1/2 in. 7/6, 6 1/2 in. 12/6; large size, very powerful, 21/-

Electro-Magnet, 9-in. arms, with 1 1/2-in. core, mounted in a wooden frame 3 ft. high, with scale pans for weights, £4 4s.

Electro-Magnets of any kind made to order.

13 and 15, Mosley-street, Newcastle-on-Tyne.

Galvanometer, horizontal index, 3/6 and 6/-		
Do.	do.	with silvered dial, brass frame 10/6, nickel plated 11/6
Do.	do.	with silvered dial, very delicate, 18/-
Do.	under glass shade, vertical index, 10/6	
Do.	Lineman's (Pocket), for testing Telegraph Work or Electric House Wires, 30/-	
Do.	with suspended astatic needles, silvered dial, levelling screws, and glass shade, 40/- (Fig. 107).	
Do.	do.	very delicate, 70/-

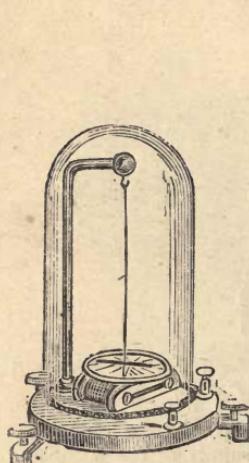


FIG. 107.

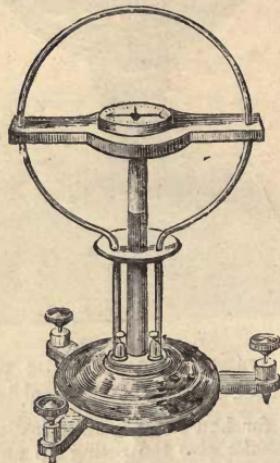


FIG. 108.

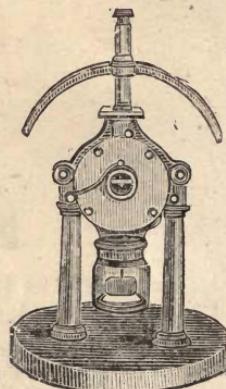


FIG. 109.

Tangent Galvanometer, with 12 inch ring and silvered dial, 65/- (Fig. 108).

Mirror Galvanometer, for testing purposes, £7 10s. (Fig. 109).

Sine Galvanometer, large size, with circle divided to two seconds, £15 (Fig. 110).

#### ELECTRO-MOTIVE MODELS.

Electric Pump, for lifting water by means of the electric current (Fig. 111), high-class finish, 32/6

Do., another make, 27/-

The same, with rod to revolve vacuum tubes at same time, 32/6

Engine with tube holder, 21/- (Fig. 112).

Electric Mill, with wheel and grindstone (Fig. 113), 27/-

Electric Locomotive, with brass rails, on a mahogany stand, 63/-

Electric Zootrope, with various sheets of comic figures, 25/-

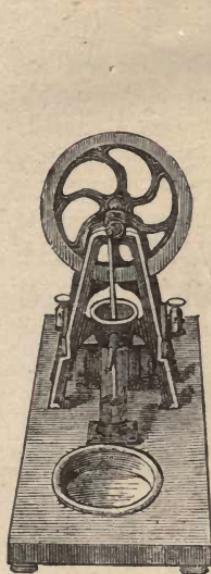


FIG. 111.

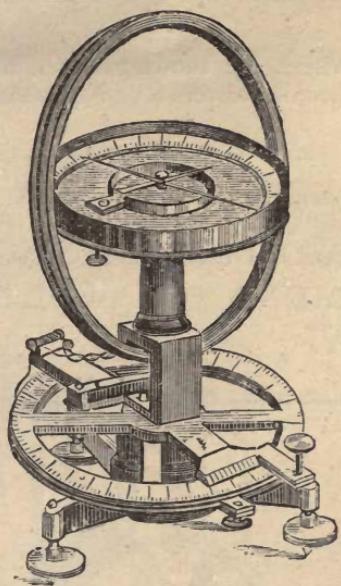


FIG. 110

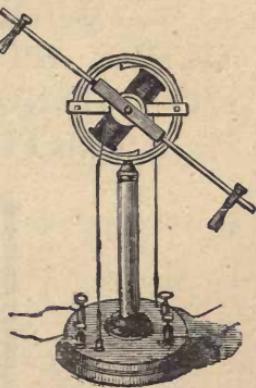


FIG. 112.

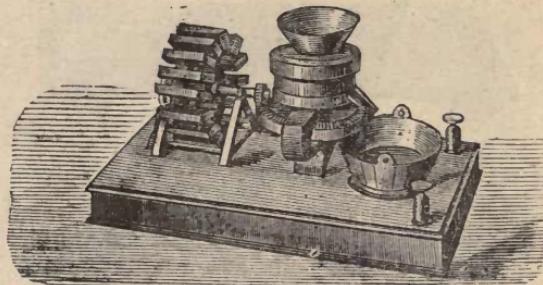


FIG. 113.

Balance Engine, very effective, 70/- (Fig. 114).

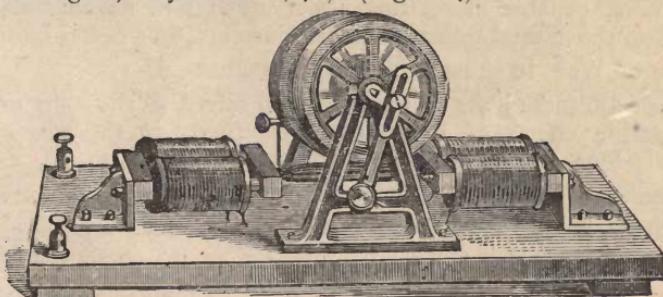


FIG. 114.

13 and 15, Mosley-street, Newcastle-on-Tyne.

Electric Tilt-hammer, 27/-

Barlow's Rotating Wheel, for showing the mutual attraction and repulsion of galvanic currents and permanent magnets, 7s.; superior, 18/-

A variety of other patterns. Every novelty as introduced.

## OTHER APPARATUS FOR SHOWING THE PHENOMENA OF VOLTAIC ELECTRICITY.

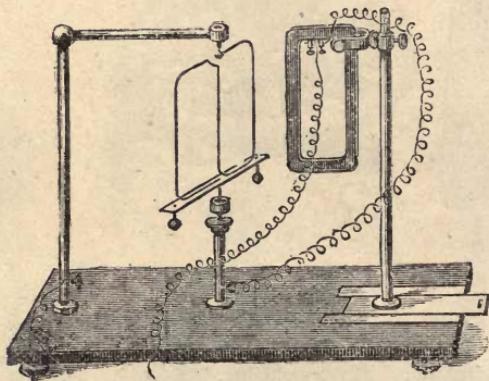


FIG. 115.

Ampere's Stand, with solenoid, circle, and rectangle, simple form, 24/-; best finish, 50/- (Fig. 115).

Apparatus to show the Currents of Electricity produced in a copper disc rotating between the poles of a magnet, 31/6

Apparatus to illustrate the construction and phenomena of Induction Coils, 30/- (Fig. 116).

Bent Wire, capable of rotating about an axis in its own plane, to show the mutual action of electric currents, 8/-; better finish, 10/-

Bobbin of Wire, to show induction by magnets, 6/-

Chain of alternate links of Platinum and Silver, to show the unequal heating effects of a current of electricity in the two metals, 1 ft. long, links 1 in., 2/6; 3 ft. long, links 3 in., 6/-

Discharger or Table for Experiments with Rhumkorff's Coils, 8/-

Discharger, Henley's Universal, with holders for carbon electrodes, 18/-

Do. do. more complete, 25/-

Faraday's Apparatus, for electro-chemical decomposition, 10/6 and 15/-

See page 11.

Faraday's Rotating Needle, 7/6

Floating Battery, with solenoid, 6/-

Do. do. with circle of wire, 6/-

Hittor's Apparatus, to illustrate the difference in the passage of the electric spark through the ordinary atmosphere and through the same rarefied, 18/-

Magnet, capable of rotating about a current parallel to it, 20/-

Magnet, Electro, revolving in a magnetised ring, 10/6

Magnet, Electro, to show the rotation of an electro-magnet between the poles of a permanent horse-shoe magnet, 14/-

Oersted's Apparatus, to show the action of an electric current upon a magnetised needle, 5/6

The same, the needle mounted on a rising pivot, the whole on insulating stand with brass foot, 27/-

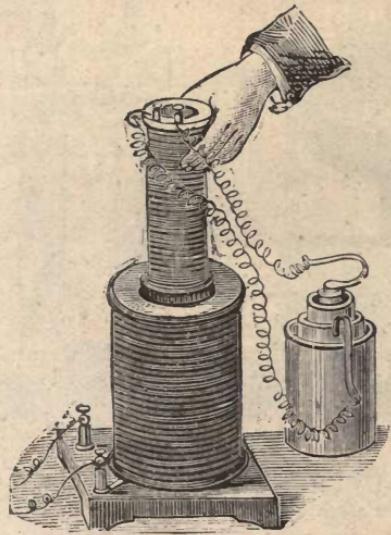


FIG. 116.

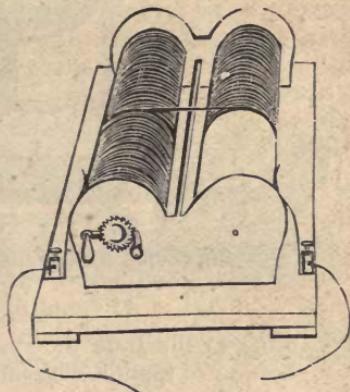


FIG. 117.

Rheocord, Wheatstone's, for measuring electrical resistances, 25/- (Fig. 117).

Do. do. better finished, 42/-

Resistance Coils of any kind to order, single bobbin, from 10/6

Solenoid, for converting a bar of soft iron into a magnet by passage of the current, 2/-, 6/-, and 10/-

Vibrating Wire, Marsh's, 5/-

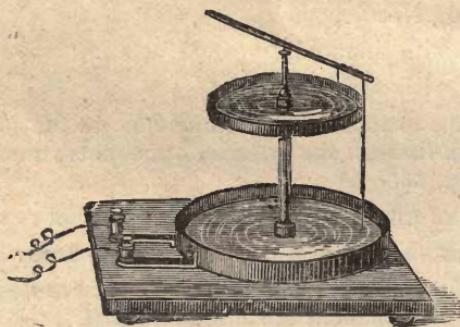


FIG. 118.

Apparatus to show action upon a rectangular current movable round an axis perpendicular to an indefinite current, 15/- and 20/- (Fig. 118).

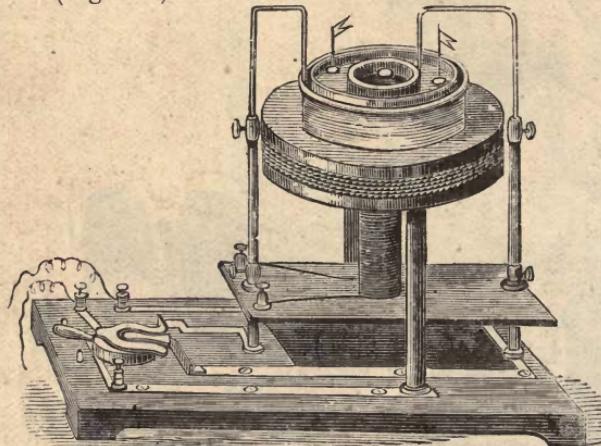


FIG. 119.

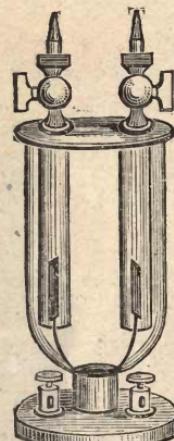


FIG. 120.

Apparatus to illustrate the Electro Dynamic and Electric Magnetic rotation of liquids, with movable stage and Bertin's Commutator, 60/- (Fig. 119).

#### VOLTAMETERS—THE ELECTROLYSIS OF WATER.

Apparatus for the decomposition of water by Galvanism, small size, having two graduated glass tubes, 3/- and 3/6

Do., larger size, supported over circular glass trough, on stand, 8/- and 10/-

Do., superior make, and larger, for lecture table (Fig. 120), 18/6, 21/- and 25/-

Apparatus, Hoffman's, on stand, 14/6

Do. same principle, 16/-

Apparatus for the decomposition of water and delivery of the mixed gases into a gas holder, consisting of a large glass jar 14 inches long, 2 inches wide, with large iron electrodes, two binding screws, caoutchouc cap, and gas delivery tube. (To be used with weak solution of caustic potash.) 7/-

Bunsen's Apparatus for the preparation of pure Oxyhydrogen Gas for analytical purposes, 12/-

Bunsen's Apparatus for Hydrogen alone, in a pure condition, 12/-

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#### SETS OF VOLTAIC APPARATUS.

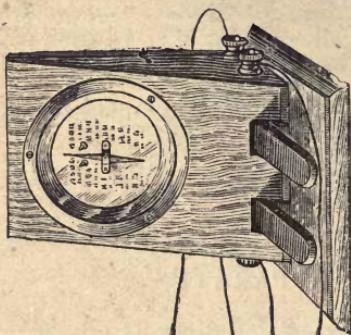
No. 1. Consisting of 2 Bunsen's half-pint batteries, galvanometer, 4-in. horse-shoe electro-magnet, bar of iron and coil, single cell electro-plating arrangement, copper solution for ditto, 12 yards copper wire, electric bell, water decomposing apparatus, in box, £1 10s.

No. 2. Consisting of small 10 cell Bunsen's battery, electric carbon holder, single cell electrolyte arrangement, copper solution for ditto, 6-in. electro-magnet, water decomposing apparatus, upright galvanometer, Ruhmkorff coil, 4 vacuum tubes, 20 yards of wire, bar of iron with movable coils, 2 electric bells, commutator, in box, £6.

No. 3. Consisting of set of 20 Bunsen's pint cells in 2 trays, automatic electric lamp, water decomposing apparatus, jar for exploding mixed gases, large coil, set of 7 spectrum tubes, box of 6 tubes, tourniquet, 8-in. horse-shoe magnet, astatic galvanometer under glass shade, thermopile, dipping needle, galvanometer (simple form), 2 model telegraphs, 220 yards rubber covered wire, 2 electric bells, 2 pushes, 20 yards thick wire, in box, £20.

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## TELEGRAPHIC INSTRUMENTS.



Model of Single Needle Telegraph,  
5/6, 10/-, 17/6

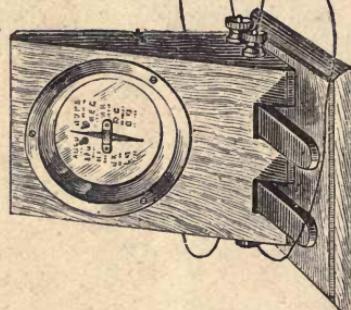
Needle Telegraph, with japanned dial, alarum, reverse and transmitting instrument, £2 10s.

Pair of Morse Sounders, with two batteries, £2 10s.

Commercial Pattern, for offices, factories, &c., short distances (up to ten miles), see illustration at side, £3 the pair.

Single Needle Instrument, best quality, as used by Railway Companies, suitable for any distance, £10 10s. the pair.

Do. do. for short distances, £5 the pair.



Breguet's Alphabetical Telegraph, with instantaneous adjustment, the 2 sets, £20.

Breguet and Crossley's Patent Telegraph, receiver, manipulator, and bell together in one box, the 2 sets, £17 10s.

## MAGNETISM.

Astatic Needles, 3-inch 2/6, 4-inch 3/6

Do. on stand, 6/6

Bars of Soft Iron, for magnetic induction, &amp;c., 12-in. long, 6d. each.

Bars of Antimony, Bismuth, and Nickel, the set, 4/6

Compass, small for the pocket, the needle with agate centre, 4/-

Compass and Galvanometer combined, small size for the pocket, in polished mahogany box, 5/6

Dipping Needle, with vertical movement only, on stand, 3/6

Do. with vertical and horizontal movement, on brass stand, 15/6

Do. with graduated arc, £1

Do. for very delicate observations, with vertical and horizontal divided circles, spirit level, and adjusting screws, £12 12s.

Iron Filings, for use in experiments with magnets, per lb. 8d.

Sieve for do., for sifting the filings on to paper, &amp;c., 3s.

Magnets, natural (or Lodestone), 1/- to 5/-

Magnets, bar—

	Inches long	6	8	10	12	18	24	
Price	- -	2/-	3/-	4/6	5/6	18/-	30/-	per pair.

Magnets, Horse-shoe—

Inch	2½	3	3½	4	5	6	7	8	10	12
Price	4d.	6d.	8d.	1/-	1/6	2/-	2/6	3/-	5/-	7/-

Magnets, horse-shoe compound, 5-in. long, 3 magnets, 7/6

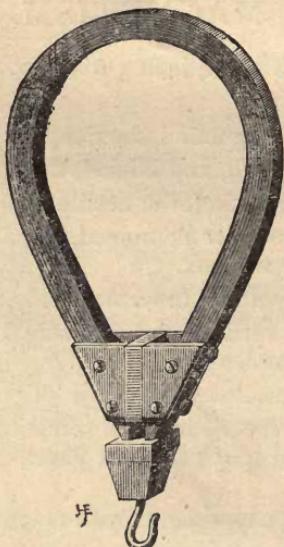
Do. do. 6, 5, 15/-

Do. do. 12, 5, 42/-

Jamin's Compound Magnets, composed of steel bands magnetised and fixed in a frame (see Illustration on next page)—

No.	No. of Bands.	Width.	Length Round.	Weight.	Lifting Power.	PRICE.
		inches.	inches.	lbs.	lbs.	£ s. d.
1	17	.39	20	.56	11	1 10 0
2	20	.39	60	.81	13½	2 0 0
3	17	.59	25	1.27	20	2 10 0
4	18	.78	28	2.40	28½	2 17 6
5	19	1.18	31½	3.30	39½	3 5 0
6	9	1.57	35½	4.70	46	3 15 0
7	18	1.97	39	17.20	176	10 0 0

13 and 15, Mosley-street, Newcastle-on-Tyne.



Magnetic Needles, with brass centre—

Inches long	2	3	4	6	9
Price each	1/6	1/6	1/9	1/9	2/6

Stand for above, 1/- and 1/6

Ditto, Single, with Agate centres—

Inch	1½	2	3	4
Price	3/-	4/-	5/-	6/-

Star Shape and circular discs of sheet iron, the set, 2/6

Steel Wires, for temporary magnets, per doz., 6d.

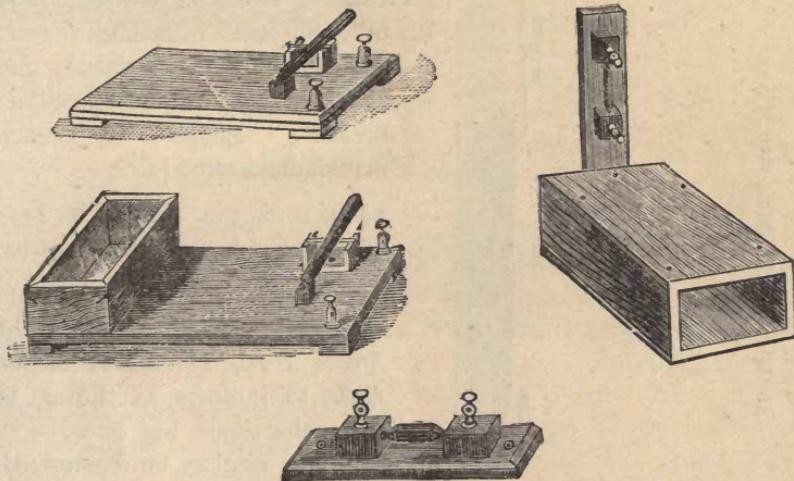
Set to Illustrate the leading principles of Magnetism, consisting of one pair bar magnets, horse-shoe magnet, magnetic needle on mahogany stand, dip needle on mahogany stand, soft iron bars, &c., to show induction, electro-magnet, Oersted's experiment, in neat black box, £1 10s.

## TELEPHONES AND MICROPHONES.

	£ s. d.
Bell's Patent Telephone, the pair—price on application	£
Electric Call Bells for above, with key and switch combined, and two 2 cell batteries, the two sets...	3 0 0
Ditto, with terminals and brass-work nickel-plated	3 10 0
Battery boxes for the above batteries	0 6 0

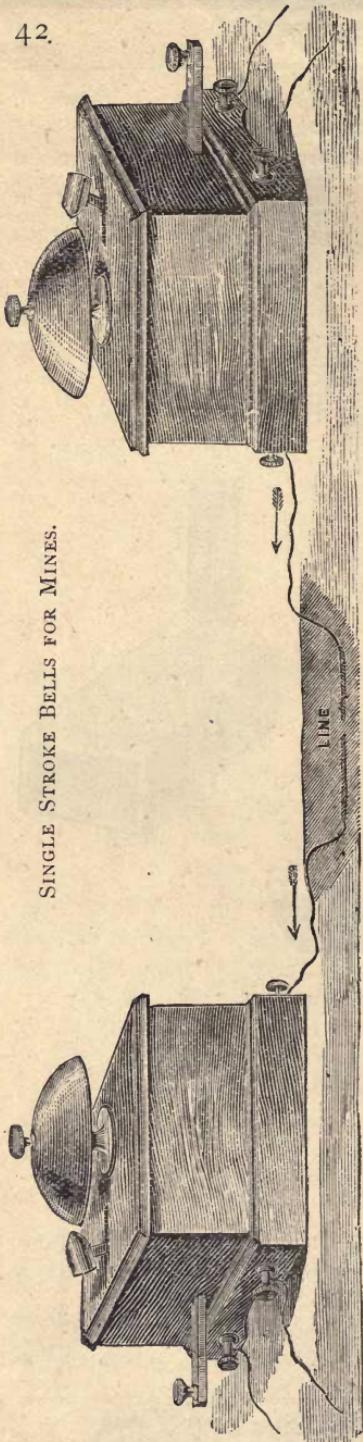
13 and 15, Mosley-street, Newcastle-on-Tyne.

				£	s.	d.
Magnetic Call Bells, dispensing with the use of a battery, for use with the Telephone, the pair...	...	...	...	6	0	0
Microphone, with 2 cell battery	...	...	...	0	12	0
Do. lever form	...	...	...	0	4	0
Do. on ebonite	...	...	...	0	2	6
Do. lever form, with fly box	...	...	...	0	4	6
Do. with sound box	...	...	...	0	4	6
Do. with 2 cell battery and Telephonic receiver	3	0	0			
Cooke's Telephone Alarum	...	...	...	0	8	6

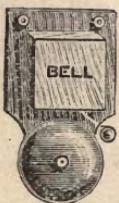
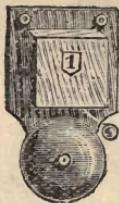


## MATERIALS FOR TELEPHONIC EXPERIMENTS.

				£	s.	d.
Bar Magnets, $4 \times \frac{3}{8}$ , per pair	...	...	...	0	2	0
Do. with adjusting screws	...	...	...	0	3	0
Diaphragms	...	...	...	0	0	2
Binding Screws, per doz.	...	...	...	0	3	0
Bobbins, empty, per pair	...	...	...	0	0	6
Do. wound with No. 36 wire	...	...	...	0	3	0



## ELECTRIC BELLS AND FITTINGS.



Trembling Bells, for domestic and other purposes, in mahogany case, the wires well insulated and provided with adjusting contact breaker. English or French manufacture same price,—

2½ in. 10/6, 3 in. 12/-, 3½ in. 15/-, 4 in. 18/-, 5 in. 25/-, 6 in. 35/- ea.

The English make can be converted into *Indicating Bells*, *Single Stroke Bells*, *Continuous Action Bells*, to indicate as shown, to strike the dome but once, or to continue ringing until stopped, 4/- each extra, three smaller sizes; 6/- the three larger sizes.

Large Bells or Gongs, for Sheds and Factories, 6 in. 35/-, 7 in. 45/-, 8 in. 60/-, 9 in. 80/-, 10 in. 100/-, 12 in. 120/-.

Single Stroke Bells, for Mines, as illustration at side, 6 in. 60/-, 7 in. 75/-, 8 in. 90/-, 9 in. 105/-.

13 and 15, Mosley Street,  
Newcastle-on-Tyne.

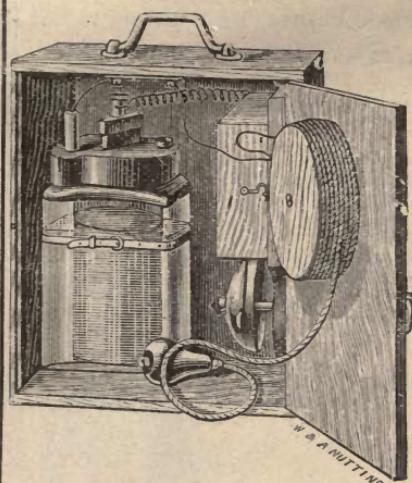


FIG. 108.

Portable Bell Case (Fig. 108), containing Bell, Battery, Push, and Silk Wire Cord, for invalids or other temporary use between rooms where no communication exists.

No. 1, with 15 yards silk wire cord, 40/-; No. 2, with 20 yards silk wire cord and larger bell, 50/-

## PRESS BUTTONS OR PUSHES.

Small, of Hardwood, Walnut, Oak Varnished, or Mahogany, 1/2 each; 12/- per doz.

Better make, Oak, Cocus, or Black—

Inches	2½	3	3½	4
Price	2/-	2/3	2/8	3/4

These are made of well-seasoned wood and with extra strong springs.

China Pushes, under 2½ in., plain, 1/2 and 1/6; with gold lines, 2/-; ornamented, 3/-, 3/6, 4/-, 4/6, 5/-

China Pushes, white and gold, black and gold, and various patterns, 2½ in. 2/3, 3 in. 3/4, 4 in. 4/6 each.

China, as above, but with ebonite backs and brass flanges, 3 in. 5/-, 4 in. 7/6 each.

Ivory, 2½ in. 6/6, 3 in. 8/6, 3½ in. 12/6 each.

Enamelled, or Silver-plated Faced Metal Pushes, on black bases, 4 in. 8/-, 5 in. 10/-, 6 in. 12/- each.



FIG. 109.

Bronze Sunk Front Door Pushes, with "Visitors" or "Servants," 6 in. 12/-, 4½ in. 9/- each.

Bronze Flat Pushes (Fig. 109), size 4 in. × 3 in., 7/6 each.

Bronze Flat Pushes, small size, 3½ in. × 2 in., 6/- each.

Push Boards or Stands (Figs. 110 and 111), of any shape, and mounted with engraved ivory tablets or numerals. These are priced from 2/6 per number.



FIG. 110.

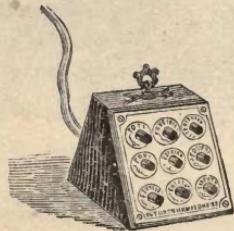


FIG. 111.

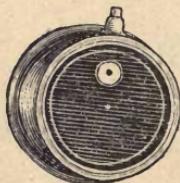


FIG. 112.

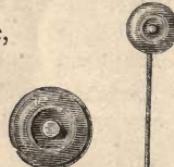
Pulls for Hall Doors, &c., from 8/6 to 35/- each.

Galvanometer Pushes (Fig. 112), for showing that the current has acted, 15/- each.

China Centres, for push buttons, with "Up" and "Down," 6d. each.

Pedal Contact, to place under dining room table, 4/6 and 10/-

Pear Pushes, in cocusc, box, mahogany, &c., 3/6 each.



Rosettes for do., 2/- each.

Pear Pushes, ivory, 15/-; rosettes for do., 4/- each.

Ivory Press, with 1¾ yards silk wire rope, 8/6

Bed Pull Boxes, for attaching ordinary bell ropes to, 3/- and 3/6 each.

Switches (Fig. 114), for turning off or altering the direction of the current, best make, 8/6

One way 3/-, two ways 3/6, three ways 4/-

FIG. 114.



## THIEF DETECTORS OR BURGLAR ALARMS.

This admirable contrivance provides for the disconnection of the circuit by the pressure of the door or window on a small spring. On the removal of the pressure by the opening of the door or window, the circuit is completed and the bell continues ringing.

Ordinary size 3/6, small size, 2/9 each.

Larger or smaller sizes can be supplied for Lodge Gates, Bankers' Strong Rooms, Cash Boxes, Tills, &c.

## DOOR TRIGGERS.

Specially adapted for shop doors, 4/- each.

A Set for a Shop Door, comprising trigger, 3 in. bell, 40 yds. wire and two Leclanché batteries, with screws and staples provided complete, for 30/-

FIRE ALARMS, OR ELECTRIC THERMOMETERS,  
8/- and 12/- (Fig. 115).

FIG. 115.

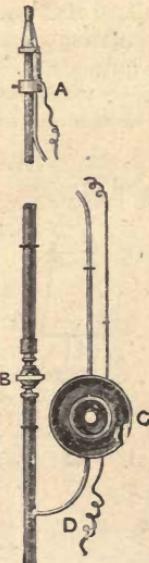


FIG. 117.

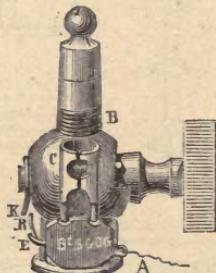


FIG. 116.

## FOR LIGHTING GAS BY ELECTRICITY, &amp;c.

Gas Lighter for Ordinary Gas Burners; contact made in turning the gas on; to work with two No. 3 Leclanché cells, 5/6 (Fig. 116).

Long Distance Gas Lighting Apparatus, warranted to work up to 150 yards; suitable for lighting sun burners, 15/- (Fig. 117).

## INDICATORS,

TO SHEW FROM WHICH ROOM THE BELL HAS BEEN RUNG. (FIG. 119).

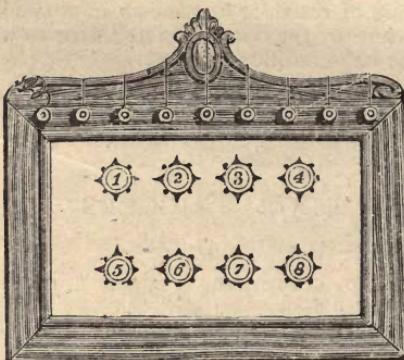


FIG. 119.

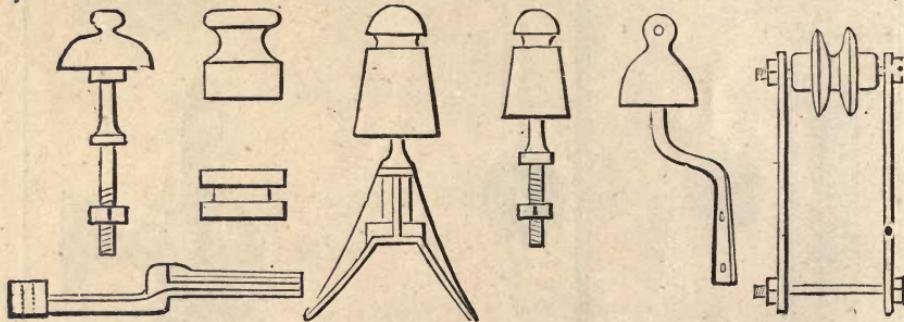
The illustration is intended to show the general form, the outward embellishment being altered from time to time.

In plain mahogany case, three numbers and under, 15/- per number; above three and up to six numbers, 12/6 per number; above six and under twenty, 11/- per number.

Special quotation when over twenty numbers.

A cheaper make of Indicator can also be supplied when required, but we do not recommend them.

## INSULATORS.



Single Shackle, Porcelain, each, 2/-

Do. do. best form, 3/6

Double do. do. " 3/8

Brownware Bolted Insulators, with saddle, each, 2/8

Insulator, with steel hook, 2/3 each.

Wall Bracket, for Insulator, each, 1/8

Small Insulator for electric bell work, or Telephone lines, each, 4d., 6d., and 8d.

Small Wall Bracket and Insulator, ditto, each, 1/3

13 and 15, Mosley-street, Newcastle-on-Tyne.

## WIRE,

Specially prepared for Electric purposes, insulation perfect, and conductivity of copper guaranteed 90 per cent. and upwards.

For Cotton-covered Wire, see p. 21. These wires, however, should only be used where no damp exists.

Caoutchouc Insulated Wire: best tinned copper covered with India-rubber, and over that cotton, variously coloured for distinction in fitting up a house; it is very flexible, and for general bell-work the most highly recommended.

	Copper Wire.	Per 100 yards.	Per mile.
No. 39.—	18 B. W. G. ...	17/6	£13 15 0
No. 38.—	20 B. W. G. ...	15/-	11 0 0
No. 37.—	22 B. W. G. ...	9/6	7 15 0

The same diameters of Copper Wire, taped and waterproofed for outside work, at the same price.

Gutta-Percha and Cotton-covered Wire. This is rather thinner than the caoutchouc-covered, and though preferred by some, cannot be so well recommended, owing to the perishing nature of gutta-percha. Covered outside, green, red, white, blue, or black cotton.

	Per 100 yards.	Per mile.
No. 700.—	22 B. W. G. ...	10/-
No. 705.—	20 B. W. G. ...	15/-

Gutta-Percha-covered Telegraph Wires. Nos. 22, 20, and 16, B.W.G. copper, single, covered with gutta-percha, to Nos. 16, 14, 12, 11, 10, 9, and 8 gauge; and No. 16, double covered, from 7 to No. 1 gauge. Prices vary; quotations on application.

Silk-covered Wire Cord, for Pear Pushes, for bringing a contact from mantel push to dining table, &c.

Green, two-cord, best quality,	6d. per yard,	doz. yards	5/6
Do. three-cord,	do.	8d. do.	7/6
Other colours to order.			

Batteries to work the Electric Bells; the Leclanché form is the one most recommended for its constancy and the little attention required. See page 16 for prices.

The Battery Power advised for different requirements is as follows:—  
 For a single bell, short distance, two No. 1 cells.  
 For three or four bells, three No. 2 cells.  
 For small house, four No. 2 cells.  
 For large house or hotel, six No. 2 or six No. 3 cells.  
 For mines, &c., varies according to length of circuit, &c.

EVERY REQUISITE  
FOR THE  
PRACTICE OF PHOTOGRAPHY.

COMPLETE SETS OF APPARATUS.

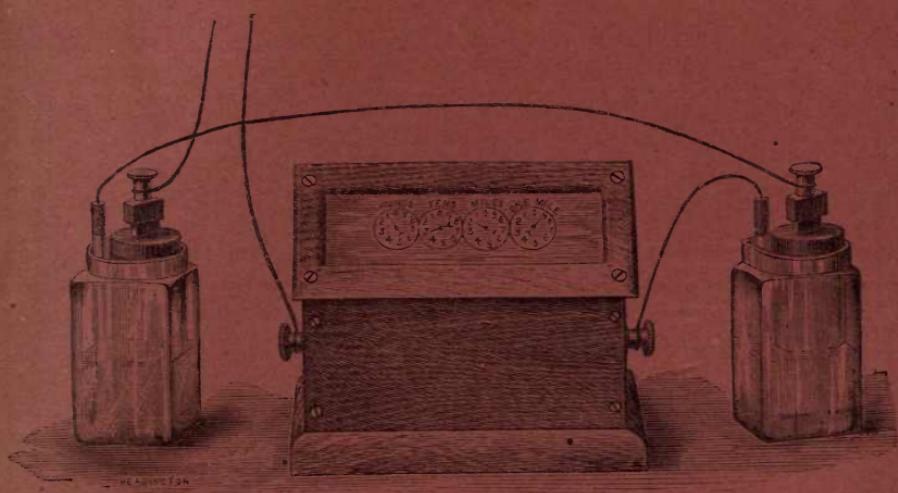
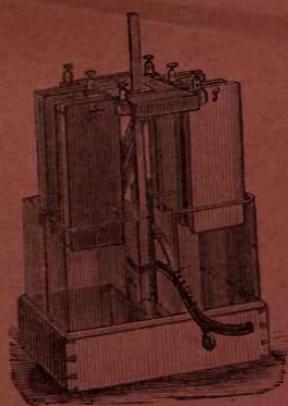
No. 1. For Plates  $4\frac{1}{4} \times 3\frac{1}{4}$  in., and two sizes smaller, consisting of Sliding-Body Camera, Double Combination Lens, Tripod Stand, Bath and Dipper, Three Plate Boxes, One Dozen Plates of each size, Scales and Weights, Funnel, Graduated Measure, all the necessary Chemicals, &c., and Book of Instructions, in case with lock and key. Price ... ... ... ... £3 10 0

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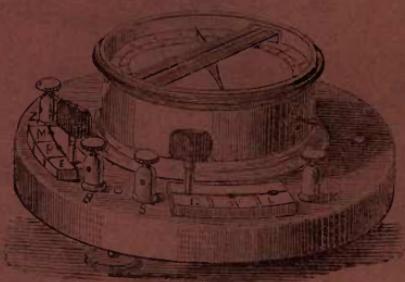
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